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Task 9.1.1 – NASA OE Infrastructure Division (OEID) Technical Assistance for Program Assessment:
National Space Grant College and Fellowship Program

Final Report

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EXECUTIVE SUMMARY

BACKGROUND INFORMATION

The National Aeronautics and Space Administration (NASA) Office of Education (OE) is responsible for the development and implementation of the agency's education programs that strengthen student involvement and public awareness about its scientific goals and missions. Through NASA's unique mission, workforce, facilities, research and innovations, the NASA OE inspires students' interest in science, technology, engineering and mathematics (STEM) education (100th Congress, 101 STAT. 860, Public Law 100-147 - October 30, 1987)[1].

The NASA Space Grant College and Fellowship Program (Space Grant) is one of two components of the NASA OE Higher Education Aerospace Research and Career Development (ARCD) Program. Space Grant is administered at the national level by an OE Program Manager. Space Grant is a state-based program operating under cooperative agreements with a lead university in each of the respective consortia and managed by a common director at that level. NASA funds a Space Grant *consortium* in each of the 50 states as well as each of the District of Columbia and the Commonwealth of Puerto Rico. Congress authorized Space Grant in 1987, under Title II of the National Aeronautics and Space Administration Authorization Act (PL 100-47) to increase understanding, research, development, and utilization of aerospace science and technology through the nation's universities. Space Grant provides a comprehensive federal-university partnership in the tradition of the Land-Grant Universities and the Sea Grant Colleges. Space Grant's national network presently includes over 850 active affiliates from universities, colleges, industry, museums, science centers, and state and local agencies. Although primarily a higher education program, Space Grant activities encompass the entire length of the education pipeline, from K-12 to higher education to informal education. Notably, a Strategic Plan issued in 2012 by the Space Grant State Director Goals and Objectives Subcommittee identifies actions Space Grant consortia assert they should take to improve their effectiveness over the next decade.[2] In its enabling legislation the National Space Grant Act in 1987, Public Law 100-147, Congress stated the goal of Space Grant Program to be to "contribute to the nation's science enterprise by funding education, research, and public service projects through a national network of university-based Space Grant consortia". The following are the objectives of Space Grant, as derived from the legislation:

i. Establish and maintain a national network of universities with interests and capabilities in aeronautics, space and related fields;
ii. Encourage cooperative programs among universities, aerospace industry, and Federal, state, and local governments;
iii. Encourage interdisciplinary training, research, and public service programs related to aerospace;
iv. Recruit and train U.S. citizens, especially women, underrepresented minorities, and persons with disabilities, for careers in aerospace science and technology; and,
v. Promote a strong science, mathematics, and technology education base from elementary through secondary levels.

[1] Source: NASA Office of Education Strategic Coordination Framework: A Portfolio Approach, June 2009, NASA Office of Education, NASA Headquarters, Washington DC
[2] http://national.spacegrant.org/meetings/presentations/Fall20112/SRuffin.pdf

The time period under study for this project is FY 2010-2014. The National Space Grant College and Fellowship FY 2010 NASA Training Grant Announcement (OMB Approval Number 2700-0085) identified the following *Areas of Emphasis* for Space Grant Consortia:

- "Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA related, STEM focused questions and issues and the incorporation of real life problem-solving and needs as the context for activities;
- Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines;
- Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges;
- Aeronautics research – research in traditional aeronautics disciplines; research in areas that are appropriate to NASA's unique capabilities; directly address the fundamental research needs of the Next Generation Air Transportation System (NextGen); and
- Diversity of institutions, faculty, and student participants. These areas of emphasis, as well as the others, will be used as categories for classifying state consortium activities and then sampling state consortium for the evaluation." (Education, FY 2010 NASA Training Grant Announcement)

Space Grant base awards have historically operated on five-year proposal cycles. NASA also provides Space Grant cooperative agreements and grants outside of the traditional base awards. These other opportunities vary in length and performance periods. When the proposals are approved, each Space Grant consortium receives funding to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure; education; public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Subsequent funding is contingent upon satisfactory annual progress reporting throughout the five-year cycle. The 52 consortia are grouped into three types of consortia based on capacity, merit, and programmatic focus – *Designated*, *Program Grant*, and *Capability Enhancement*. Designated and Program Grant consortia focus on all three main components of the Space Grant program – education, research, and public service, while Capability Enhancement consortia are directed to place more emphasis on education and research activities. Each consortium is required to provide 1:1 non-federal cost share for all non-fellowship/scholarship program dollars. Consortia submit annual progress reports, program plans, budgets, and enter activity and outcome data into the web-accessed OE Performance Measurement (OEPM) database.

PURPOSE

This executive summary highlights key elements and findings in the process of providing technical assistance in the planning of a future evaluation of activities funded through the National Space Grant College and Fellowship Program FY 2010 NASA Training Grant Announcement (OMB Approval Number 2700-0085). The evaluation technical assistance activities were executed across

two Phases extending from October 2014 through September 2015. The technical assistance project had three primary objectives:

i. To fully document the current SG program model, including inputs, strategies/activities, outputs, and short-, intermediate-, and long-term outcomes in consultation with the SG stakeholder community;
ii. To conduct an assessment of performance data, reporting and program documentation held by SG Consortia and the NASA OE to ensure that appropriate, valid and reliable data are collected to document SG strategies/activities, outputs, and outcomes at the consortium and national levels;
iii. To prepare a design and plan for an external evaluation study and make formal recommendations to improve NASA's performance monitoring and preparedness for future SG program evaluations based on a thorough review of previous evaluations, consultation with the SG community, and the results of the assessment of performance data, reporting, and program documentation.

Relevant to the third objective, the NASA OE also proposed evaluation questions for a future external evaluation study of the Space Grant program and requested that the contractor assess the viability of these questions. The draft evaluation questions are presented below.

1. Are Space Grant activities being carried out in compliance with Public Law 100-147 and in alignment with the priorities of NASA OE and NASA research and technology development?
2. To what extent are funded activities engaging the intended populations (i.e., diverse students, faculty, and institutions) and meeting program goals as defined in the 2010 solicitation?
3. To what extent do the methods of soliciting applications or requests, review of those requests, and awarding and distributing SG funds support the quality of the results?
4. What effective practices exist in consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields? To what extent do these practices ensure the quality of results?
5. What have been the SG's major contributions to NASA's education mission?
6. Given the national investment in the SG program, what, if any, new approaches to the management of the SG program should NASA consider for the future?
7. In all, what are the challenges, barriers, and constraints encountered in ensuring high-quality results?

SPACE GRANT PROGRAM MODEL AND EVALUATION QUESTIONS

In order to document the current Space Grant program model and prepare a design and plan for an external evaluation study and make formal recommendations to improve NASA's performance monitoring and preparedness, the contractor consulted with Space Grant stakeholders. Community consultation was instrumental in producing a logic model that documents the Space Grant program model, revising the draft evaluation questions, and preparing recommendations to streamline

performance monitoring. Community consultation was conducted in two distinct phases. A summary of methods and findings for these two phases is described below.

PHASE I: METHODS (OCTOBER 2014 – MAY 2015)

NASA Space Grant leadership identified four key stakeholder groups for inclusion in discussion groups: (1) Space Grant Affiliates; (2) NASA OE Coordinating Council (ECC); (3) National Council of Space Grant Directors; and (4) National Space Grant Foundation. The intent of the discussion groups was to gain a better understanding of the position of the Space Grant program in NASA's broader educational agenda, identify the measurable goals and objectives of the Space Grant program, and to formulate evaluation questions for each goal and objective to be used for Space Grant evaluation later. Over the course of two weeks, between late January and early February 2015, recommendations of 59 discussion group participants were received. Based on the review of criteria, 32 participants were selected for participation. Prior to the discussion group, NASA staff and affiliates who were asked to participate in the groups were sent an e-mail from the contractor describing the purpose of the groups and obtaining pertinent scheduling details needed to schedule the groups. A protocol including open-ended questions was developed to encourage stakeholder participation in the discussion groups on the following topics:

- Space Grant program model, including goals, objectives, key strategies/activities, outputs, and anticipated short, intermediate, and long term outcomes;
- Space Grant performance monitoring and evaluation methods, data sources, instruments (including rubrics), reporting and program documentation, including factors affecting the success of performance monitoring and evaluation activities;
- Proposed evaluation questions prepared by the OE; and
- Data sources relevant to the evaluation questions, particularly those that are different than data used for past assessment studies.

The discussion guide was developed to ensure the moderators' ability to obtain information from participants around each topic area without asking the same questions more than once. Each group was scheduled to last no longer than two hours. The actual duration of these groups ranged from 60 minutes to 98 minutes, depending on the participants' knowledge of Space Grant and other topics areas discussed. The average length of the groups was 79 minutes. Each discussion group interview was audio recorded and a third-party transcription service was used to provide transcripts for the group discussions. Hand written notes were also taken at each group.

PHASE I: FINDINGS (OCTOBER 2014 – MAY 2015)

The following is a summary of the results of Phase I organized by discussion topic.

Topic 1: Program Model, Goals, Objectives, Key Strategies, Activities, and Outcomes

Many of the participants, across discussion groups, noted that Space Grant has evolved over time into a diverse and unique program that supports a multitude of activities producing outcomes specific to each state's NASA focal area. In the words of one participant:

> *Something that's most unique about the Space Grant Program is that it's a national program with shared goals across the country where each state consortium contributes in a unique way to meeting the goals of the National Space Grant and that sets up very different program models across the country to utilize some state resources to best meet individual state needs all in the arena of working with NASA education to meet NASA program goals.*

Specific program activities, with the exception of NASA sponsored research and under-represented student and workforce recruitment and development, were noted as being difficult to identify across Space Grant due to the diversity across state consortia. Specific outcomes mentioned included increased graduation rates of underrepresented populations in STEM related degrees, entrance into STEM employment and increased NASA research efforts and presence in states including those without NASA centers.

Topic 2: Space Grant Performance Monitoring and Evaluation.

Altogether, discussion group participants had numerous thoughts and recommendations regarding monitoring and evaluation. Many participants agreed that a great deal of data is collected and it is unclear how all of those data are utilized. In the words of one participant:

> *One current experience that I think that all of us have appreciated is that the progress reports are an opportunity to tell some of the personal success stories and such that we aren't able to tell in an OEPM database reporting instrument, but the most current guidelines for the progress report limited submissions to eight pages long with many, many, many things that are supposed to be included in each section of the report to report adequately. I know that through time with many of the types of review reports and such that we have written, we spend a huge amount of time trying to cut content to make page limits.*

They also suggested that more people per grantee site be granted to access OEPM in order to enter data as well as allowing data entry year-round. Requests were voiced for the ability to make additions and modifications to OEPM reports after the fiscal year in order to update information occurring after the reporting period ended. It was also suggested that OEPM might be extended with the capacity to provide grantees a comparison between their respective states as well as to the national standard. Pursuant to this, a number of participants suggested that incorporating Geographic Information System (GIS) technology into the OEPM would improve Space Grant's capacity at data management, data mining, and geographic representation. Additionally, it was opined by many participants across discussion groups that aligning the reporting schedule to the academic school year would streamline the reporting process, particularly if grantees had the ability to pre-populate data entered from previous years. Finally, participants expressed a desire for NASA to clearly articulate changes to mandatory reporting to all individuals involved in data collection and reporting.

Topic 3: Proposed Evaluation Study Research Question Review

It should be noted that there was consensus across discussion participants that it would be both difficult and unnecessary to rank or prioritize the evaluation questions as they were all deemed equally important. The first major result of discussion was the development of suggestions for additional questions as well as revisions to the existing questions. For example, one participant wanted the questions reworded so they "are not posed in such a way that they asking if we do comply with these things, we have no choice in complying with these things. It's required." Although, this particular group observation certainly carried the assumption that all stakeholders do everything that is required of them, the point was articulated that it would be more politic to ask "how" – as opposed to "whether" – grantees were in compliance. Furthermore, it was argued that the multipart nature of question 1 was problematic. Multiple participants noted that evaluation questions 2, 4, and 5 help measure program impact. Likewise, participants noted numerous challenges that may arise when answering evaluation question 7. Time constraints for reporting and conversations were identified as challenges; as was funding (e.g., uncertainty and sustainability). Each of these was recommended to be considered in future external evaluation.

Topic 4: Performance Data Reporting and Data Sources for Evaluation

Although participants generally reported no major issues with data definitions and reporting, a few definitions and selected data elements were identified as causing some confusion. One participant lamented:

> *The same information is being requested in three different ways when one would do; so maybe a review of the data being requested from the vantage point of potential redundancy or to what is the data being used and why is it relatively important.*

Another definitional issue was the dual role of university faculty (teaching and research), some discussion group participants expressing difficulty in making distinctions between higher education and research infrastructure reporting. There was also uncertainty regarding whether any given publications were the direct result of Space Grant. Other issues included the formal definition of a fellow as well as how to document federal funding from sources other than NASA. Discussion also touched upon the possibility that some demographic data currently required may be too intrusive to gather from volunteers. Overall, commentary from participants described that more effective, timely, and more frequent transparent communication was needed moving forward. Some participants noted wanting and needing to know more about the Space Grant activities so they could provide answers to simple questions whereas others wanted more responsive communication from NASA and the OE to assist them with Space Grant efforts in their state. In each of the groups, the strength of collaboration across states, consortia, and industries was noted as having a positive and lasting effect on Space Grant.

PHASE II: METHODS (JUNE-SEPTEMBER, 2015)

During the second phase of information collection for this technical assistance task, Paragon TEC talked with NASA OE Staff to learn what Space Grant Program looked like for the grant cycle FY

2010-2014 award. Four Space Grant staff were contacted and requested to participate in a two-hour interview to assist Paragon TEC to help:

- refine NASA's evaluation questions for the 2010-2014 National Space Grant;
- further develop a Logic Model that reflects Space Grant program's goals, objectives, key strategies, activities, outputs, and outcomes; and
- learn more about Space Grant Performance Monitoring and Evaluation.

Following this interview, five of the 52 SG consortia were contacted for interviews. Consortia directors and other key staff offered their feedback on the Logic Model and how it mapped to outcomes and program strategies of Space Grant Program and their OEPM data system experiences. A final follow-up interview was conducted with two NASA Space Grant staff to provide clarity on information garnered from consortia interviews. These conversations, along with the 2010 Space grant solicitation and the data reported to OEPM system, informed development of a Logic Model and evaluation plan.

PHASE II: FINDINGS

In summary, the evaluation questions included above were found to be relevant, appropriate, and tractable, and were, therefore, not revised as a result of this technical assistance. However, key comments made during Phase II interviews are included here to help better understand staff perceptions of these questions and context for future evaluations.

Topic 1: Evaluation Questions

Evaluation Question 1. It was noted that EQ1 may be difficult to answer because priorities changed annually during this time period. One comment was: "*In order for the program to remain relevant year to year, we would provide what would be the priorities or key areas of emphasis on an annual basis because those would shift and change as the Agency shifted."* Staff also stated that priorities had to comply with the strategic coordination framework[3] (Outcomes 1-3 at the time), although Space Grant shifted away from these in 2015. The federal government also switched its focus from PART measures to performance goals and annual performance indicators (APIs) during this time.

Evaluation Question 2. It was stated that the definition of "diverse" should be clarified because diverse "does not just mean under-represented and underserved populations and it did not just mean women"; diverse also refers to the type of institutions and whether a range of institutions were represented by faculty and students in the consortium. It was stated that assistance is provided for consortia who have challenges recruiting and training underrepresented minorities, including a) providing a mentor, b) offering more one on one time, and c) matching consortia that are weaker in this area with those that have been very successful and are willing to share best practices and strategies. It was also mentioned that there are national meetings where panels focus on sharing diversity strategies.

[3] Source: NASA Office of Education Strategic Coordination Framework: A Portfolio Approach, June 2009, NASA Office of Education, NASA Headquarters, Washington DC

Evaluation Question 3. One staff member stated it was unclear whether this question was referring to: a) the solicitation and proposal review process at the headquarters level as it relates to base awards, multi-year renewal, annual renewals, and additional opportunities, or b) identifying successful processes or approaches that a consortium would use as they look at competitively awarded funds. Another staff member commented that, "It is Important to have questions at the national *and* the consortium levels, looking at the intake for proposals and then looking at the consortium level – assuming this process is different."

Evaluation Question 4. The NASA OE Staff stated that they had not done anything related to effective practices, and that the last five-year evaluation period covered the period of 2003-2007. All data collected from consortia were self-reported, including the self-evaluation that covered whether their practices were effective. In addition, the Annual Performance Document (APD) documents that consortia completed annually included self-reported anecdotal data. For the award, the consortia submitted APDs to the program office, and the APD compared their proposal with their reached goals.

Evaluation Question 5. When asked about Space Grant's major contributions to NASA's education mission, the NASA staff members stated that PART measures switched to Performance Goals and APIs and that PART measures looked at indicators of success and all organizations within NASA had to track PART measures. Staff believes that Space Grant exceeds goals and have "phenomenal graduation numbers."

Evaluation Question 6. Staff suggested an "improvement practice," where Space Grant would look into the progress of consortia at the mid-year point to provide struggling consortia iterative feedback and a chance to improve their performance prior to the 5- year assessment period. Staff also commented that they would like the opportunity and resources to do more site visits.

Evaluation Question 7. There were no comments or suggestions directly related to this evaluation question. However, when asked to operationalize what was meant by "high quality results", the NASA staff members viewed this term differently, with responses including: (a) publications, presentations, conferences, (b) dosage and exposure, (c) student engagement in hands-on activities, and (d) success of students in STEM majors and careers.

Topic 2: Logic Model / Program Model

At the beginning of this task, no Logic Model was provided. Therefore, it is considered a significant result of this technical assistance that a Logic Model was developed based on feedback received during interviews and the review of relevant SG documents; the logic model immediately follows this topic section. It is important to note that this Logic Model reflects the 2010-2014 Space Grant program. The text that is included within the Logic Model includes relevant comments and feedback from Phase II interviews that contributed to the development of the Logic Model. Input was also sought concerning cost sharing and leveraging Space Grant investments. One participant informed us that feedback would vary by consortia, indicating that "While we all deal with certifying the required match, I think [we] may be somewhat unique in our more entrepreneurial approach to Space Grant funding, our desire to grow our program through additional match or external funding, and our ability to take such an approach." Another participant

further clarified that this matching equals 74% for both designated and program awards, and that "All Space Grants must plan for/attract and certify through reporting processes that at least the 74% level of matching funding is met." This participant indicated that the matching requirement is detailed in the last five-year RFP in "Section E: Funding and Cost-Sharing (Matching)". Overall, stakeholders agreed to the elements of the proposed Logic Model (on the next page). However, there were some specific elements with additional caveats, which follow.

Objectives

Space Grant staff cautioned that objectives vary by consortia and by consortium type (i.e., Designated Consortia, Program Grant Consortia, and Capability Enhancement Consortia). One staff member stated, "All consortia have the freedom to operationalize goals differently… Consortia have the flexibility to emphasize some objectives more than others." One exception that was frequently noted was the requirement for consortia to have fellowships and scholarships. It was also noted that there were shifts in priorities during this time period. For example, the Summer of Innovation program led to more consortia focusing on middle schools for designated and Program Grant Consortia, while Capability Enhancement Consortia never had to focus on K-12.

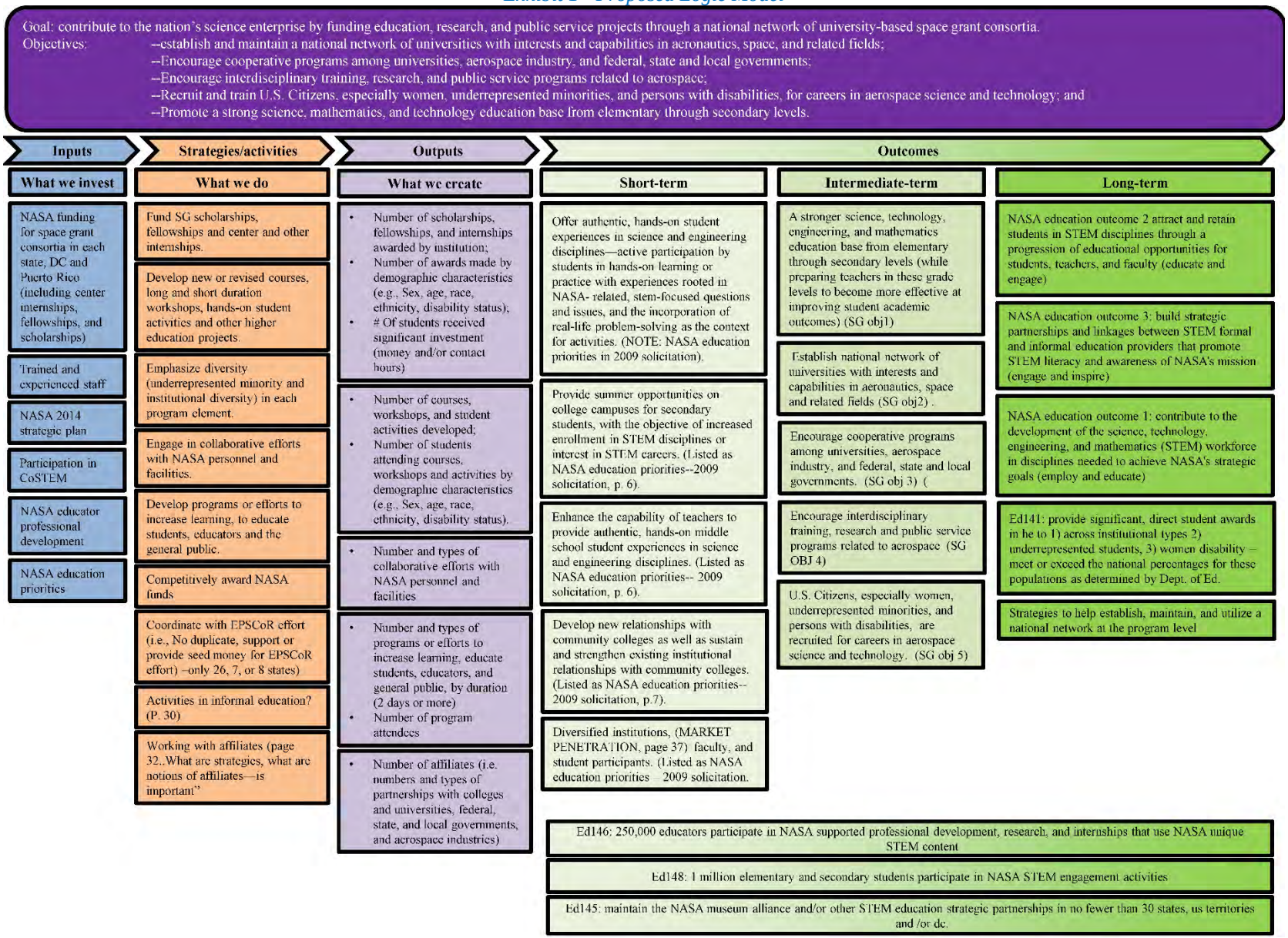
Strategies / activities

Space Grant offered potential additions to the strategies/activities that were embedded in the Logic model. One consortium recommended adding "**collaboration with non-profit groups and community organizations**" and "**collaboration with museums**" to the types of programs currently in the Logic Model. Another director mentioned adding "**minority serving institutions to include Indian Nation members**." Another mentioned a heavy "**focus on research**, especially research with topics connected with a NASA center" and believed that should be reflected in strategies and activities along with the inclusion of "research infrastructure." Finally, one consortium mentioned adding strategies that "emphasize excellence, and recognize that NASA curriculum elevates the level of discussion, inspiring students…there's also more at stake for the students, faculty, institutions, the state [because] NASA activities are of a higher quality and standard… strategies should promote excellence and acknowledge exceptional performance." He suggested that measures that track impact should be highlighted. All stakeholders agreed that qualitative measures were absent from the Logic Model and OEPM.

Outputs

According to them, the consortia made their own decisions about what to emphasize in every category except for fellowships and scholarships, and there is a minimum amount of funding that must be applied to that component. Consortia directors agreed; not all strategies apply to all consortia; consequently, the outcomes may vary by consortia. Some additional outputs and noted by consortia included: number of students taking part in group hands-on projects; senior design courses and competitions; students in interdisciplinary group projects; design and engineering competitions; number of students involved in research projects; and longitudinal track of percentage of students who continue further into academia or a STEM career.

Exhibit 1 - Proposed Logic Model



PERFORMANCE MONITORING

This section presents findings from a review of data and documentation that were collected through report forms, Survey Monkey, and the OEPM system during the years of interest (2010-2014). The primary purpose of the review was to assess the viability of the data and documentation for use in performance monitoring and evaluation. The assessment of data quality revealed only a small number of data elements may be used for external evaluation purposes because only a handful of data elements were consistently collected across multiple years; can be validated by other sources; and using data definitions consistently applied by Space Grant consortia. Before presenting these data, we first describe the reasons why data were not consistently collected and reported by Space Grant consortia during the FY2010-2014 cycle. Second, we examine how these inconsistencies affected data quality and limitations of the data elements that can be used for an external evaluation.

PERFORMANCE MONITORING SYSTEM DURING FY2010-2014 GRANT CYCLE

A review of documents (data samples, Annual Performance Data Report, etc.) and interviews with NASA OE staff, consortia directors, and community stakeholders indicated data collection and reporting were not consistent over the years due to internal and external factors to the Space Grant Program. Consortia projects varied by focus area based on state needs and interests but also due to proximity to NASA centers; affiliate involvement; and the existence of the Experimental Program to Stimulate Competitive Research (EPSCoR) Variation in the focus area of consortia projects based on state needs and interest; differences in grant categories; differences in student demographics; grant are internal factors that shaped the programming of each consortium during this time period. The external factors included changes in policy and priorities within NASA and changes in data requirements from the Office of Management and Budget. For example, when the current grant cycle began in 2010, the consortia reported on program contributions to Performance Assessment Rating Tool (PART) measures, but PART was discontinued in 2012.

While the consortia have been required to report many types of data, not many data types were collected consistently over the five-years of interest. Also, as the interviews with selected consortia directors indicated, consortia varied as to how they collected and validated data. A major cause of the inconsistences was the change of data collection systems during this grant cycle from Survey Monkey to the OEPM system. The OE used Survey Monkey to collect program performance data for FY 2010 and FY 2011. OEPM was used starting with FY 2012 reporting. Survey Monkey and the OEPM collected different levels of data. For example, while Survey Monkey collected program information at the aggregated number for each sub-element, such as the number of Research Infrastructure projects a consortium provided during FY 2010, the OEPM system collected information at the project activity level, which is a smaller unit than sub-element. This change creates a problem for documenting program outputs and outcomes longitudinally because the aggregated numbers cannot be broken down into outputs of individual programs. The way OEPM collects data is better because it links outputs and outcomes with each project activity. Also, the change from Survey Monkey to the OEPM system resulted in the change of the relationship between program activity and program outcomes. While Survey Monkey captured outcomes, such as publication and technology transfer, as a result of the all activities that lead to Outcome I (Fellowship/Scholarship, Research Infrastructure, and Higher Education Program),

OEPM is structured to capture the same outcomes as a result of project activities that are marked as Research Infrastructure and Higher Education. For example, if Fellowship/Scholarship students produced papers, the OEPM system did not count them.

Finally, the data submission due dates of Survey Monkey and OEPM systems did not align with the program cycle. The Space Grant Program performance period varied by consortium because award dates varied. Some consortia reported the performance for their project year. Other consortia reported their performance based on the OEPM due date, and others set their own cut-off date so affiliates would have enough time to collect and compile data. This misalignment presents a challenge for external evaluation because the data collected by Survey Monkey and the OEPM system do not necessarily cover a specific project year, thus comparison between consortia is difficult. The Annual Performance Data Report aligned with the program performance period; however, since the award date varied and the consortia period of performance varied, the data reported did not reflect the same reporting period for the consortia.

Data Elements for External Evaluation

Only a small number of data elements collected in Survey Monkey and/or the OEPM system over at least a two-year period were considered as being of relatively high quality, meaning the data are possibly valid and reliable across consortia. The following data elements were rated valid because the aggregated number reported can be traced back to the raw data, the data were reported by using standardized methods, or the data can be validated by using other sources. These data are as follows:

- Institution type of affiliates and if they are Minority Serving Institutions (MSIs) in Survey Monkey (by cross referencing with information reported in Annual Performance Data Report) and in the OEPM system.
- The number of fellowship/scholarship recipients and their demographic and other information in the OEPM system.
- The number of students who received a significant investment and their demographic and other information in the OEPM system.
- The number of new or revised courses in the OEPM system. As for FY 2010-2011, only aggregated numbers were available in Survey Monkey.
- Publications, invited papers, papers presented, patent, technology transfer, additional grant and their amount were saved in the OEPM system. As for FY 2010-2011, only aggregated numbers were available in Survey Monkey.

Another consistently collected data element was tracking data of students who received a significant investment, which was reported in Student Tables. However, since they are aggregated numbers, the evaluator will need to find out how each consortium collected and validated the data. It is important to note that these data were self-reported by the consortia, and some consortia had more thorough data collection and validation processes than others. For example, from an interview with a consortium director, we learned that when consortium personnel changed, this consortium had a difficult time tracking students who received a significant investment and if these students advanced to STEM employment (Student Data Table). Consequently, this consortium might have under-reported the number of students who had advanced in the STEM pipeline. In

addition, from a data quality perspective, the current data entry procedures of the OEPM system may not be the best way to collect sensitive information, such as disability status. Some people may not want to disclose sensitive information not knowing who will be entering the data into the OEPM system, consequently, there may be underreporting of personal information.

RECOMMENDATIONS

DATA COLLECTION

The NASA Office of Education (OE) will need to prioritize data collection required for Agency-level performance reporting as there is limited amount of core data elements that are comparable across Space Grant consortia in order to capture program activity, outputs and outcomes. The following data are required by the 2014-2016 NASA Strategic Plan:

- For each fellowship/scholarship recipient and student who received a significant investment, the following information: gender, race, ethnicity, disability status, and institution name.
- The number and type of direct participants to each of Space Grant project activity.

To ensure the reported information is valid and comprehensive, NASA OE should consider the following recommendations:

- NASA OE should use the Space Grant logic model and data quality assessment (DQA) presented in this report to revise Space Grant data collection and reporting forms in the OEPM system. The purpose for the revision is to reduce data collection burden while focusing on collection of data elements that align with key inputs, outputs and outcomes.
- NASA OE should respond and streamline data collection and reporting. The stakeholders reported redundancy and burden of data collection and reporting.
- NASA OE should review whether it is possible to require access to student demographic information for fellowship scholarship and funding awardees for all consortia and affiliates. At a minimum, NASA OE should establish data collection agreements subsequent to awards so that all awarded students' demographic information can be collected.
- NASA OE should require consortia to report their respective definitions of "significant investment" used for each student reported. Alternatively, NASA OE could standardize definition of "significant investment" to be tied to finances, possibly at the level of $5,000. Interviews revealed variation in definition of "significant investment," with some consortia using financial thresholds (of varying levels) and other consortia using qualitative criteria.
- NASA OE should require all consortia report their data collection methods including any uncertainty, such as potentially missing data.
- NASA OE should institute uniform data collection with respect to direct participant attendance for all project activities. For example, NASA might require a sign-in sheet that should be signed by participants on the day of the activity in order to provide verification for the numbers reported. This documentation should be kept on file to support the performance data entered into the OEPM system.

- NASA OE should consider the feasibility of allowing rolling year-round reporting to the OEPM system and whether more people should be granted access to the OEPM system in order to enter data directly as recommended by the stakeholders during the stakeholder consultation.

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While the consortia have been required to report many types of data, not many data types were collected consistently over the five-years of interest. Also, as the interviews with selected consortia directors indicated, consortia varied as to how they collected and validated data. A major cause of the inconsistences was the change of data collection systems during this grant cycle from Survey Monkey to the OEPM system. The OE used Survey Monkey to collect program performance data for FY 2010 and FY 2011. OEPM was used starting with FY 2012 reporting. Survey Monkey and the OEPM collected different levels of data. For example, while Survey Monkey collected program information at the aggregated number for each sub-element, such as the number of Research Infrastructure projects a consortium provided during FY 2010, the OEPM system collected information at the project activity level, which is a smaller unit than sub-element. This change creates a problem for documenting program outputs and outcomes longitudinally because the aggregated numbers cannot be broken down into outputs of individual programs. The way OEPM collects data is better because it links outputs and outcomes with each project activity. Also, the change from Survey Monkey to the OEPM system resulted in the change of the relationship between program activity and program outcomes. While Survey Monkey captured outcomes, such as publication and technology transfer, as a result of the all activities that lead to Outcome I (Fellowship/Scholarship, Research Infrastructure, and Higher Education Program), OEPM is structured to capture the same outcomes as a result of project activities that are marked as Research Infrastructure and Higher Education. For example, if Fellowship/Scholarship students produced papers, the OEPM system did not count them.

Finally, the data submission due dates of Survey Monkey and OEPM systems did not align with the program cycle. The Space Grant Program performance period varied by consortium because award dates varied. Some consortia reported the performance for their project year. Other consortia reported their performance based on the OEPM due date, and others set their own cut-

off date so affiliates would have enough time to collect and compile data. This misalignment presents a challenge for external evaluation because the data collected by Survey Monkey and the OEPM system do not necessarily cover a specific project year, thus comparison between consortia is difficult. The Annual Performance Data Report aligned with the program performance period; however, since the award date varied and the consortia period of performance varied, the data reported did not reflect the same reporting period for the consortia.

While additional Space Grant data to be collected are still open to discussion, NASA OE and consortia will need to agree on the Space Grant model, variations, and common objectives in order to effectively implement a performance monitoring system. Consequently, the Space Grant Program may need to decide on the program model or set of models and align the data to be collected. The present technical assistance made it clear that, without a common objective, each consortium will create its own performance objectives and data to report. At a minimum, Space Grant may need to be delineated into groups of consortia with the same characteristics. For example, consortia that have a NASA Center within their boundaries may share similar challenges, strategies and outcomes; consequently, they may be categorized into one group. Performance monitoring system should be developed based on the program model(s). NASA OE should consider the following recommendations:

- Track participants longitudinally to capture if they are in the STEM pipeline or employed in a STEM field. NASA OE may need to specify a number of years after participation for tracking.
- Continued data collection on affiliates and non-affiliates. This informs NASA OE of affiliate and non-affiliate involvement in project activities and identifies the affiliate as a community college or a MSI, as diversity is an important element of Space Grant goals and objectives.
- While output and outcome data collected during FY 2010-2014 (i.e., revised and new courses, publications, presentations, technology transfers, and additional funds) are valid and reliable data, NASA OE may want to reconsider whether they are sufficiently related to the Space Grant Program model. The logic model we propose from this technical assistance did not include these outcome or output data. According to the proposed logic model, below are data elements that we recommend to collect to measure outputs:
    - Individual level demographic information and other information, such as institution attending and major of students who received scholarship/fellowship/internship (added recently) and significant investment. These are valid and reliable data as far as they are recorded in Student Award page. As described previously, some consortia may not have comprehensive information.
    - Project activities, names of participating affiliates and non-affiliates and their types and NASA partners. Name and types of organizations are valid and reliable data. The nature of partnership is not systematically documented.
    - Direct participants to each project activity by type. These are currently less valid data as consortia valid the way they collected data.
    - New and revised courses and estimated number of students who will take these courses. The names of new and revised courses are valid and reliable data.
- Consortia should report how their programming reflects their respective state's needs. The current Annual Performance Data Report does not ask this question, but both OE staff and

consortia directors mentioned responding to state needs was an important aspect of Space Grant Program. Additionally, NASA OE may catalogue and publish different context, programming, and consequently outputs and outcomes of consortia so that consortia can learn from each other.

- NASA OE should publish a program-level annual performance report in order to inform consortia about the status of the national program. The report should provide a reference point for each consortium about program characteristics, area of focus, outputs and outcomes, to articulate the Space Grant model and the diversity of the consortia. This type of reporting to consortia could be one of the ways to respond to the concern raised by the stakeholders that they were unclear how data they reported were utilized, and they wanted to know more about Space Grant. The report also can address the recommendations from the stakeholders to include the national reference points to evaluate consortia's progress and outcomes.
- NASA OE should look into if aligning performance period is possible to streamline data collection and to make data comparable across year and across consortia.

Limitations

The above recommendations did not include the cases where data would be used for other purposes, such as responding to congressional staff inquiries related to their respective congressional districts. Consortia may need to review if the data are needed for other types of reporting and if the same data collection process is useful. Finally, the above recommendations have not considered what may be future data requirements. Agency or federal requirements may change over the years and make it difficult to continue to collect the same set of data over a period of years.

Logic Model

With respect to the Logic Model, NASA should consider the following recommendations:

- Logic Model outcomes should also be in the Agency Performance Indicators (APIs) and/or performance goals.
- The Logic Model should be used with consortia and community stakeholders to illustrate the goals, strategies, objectives, outputs and outcomes of the Space Grant program. The Logic Model can also be used as a guide among consortia for strategic planning.
- Increase the number of site visits to help consortia improve management processes.
- Include qualitative data collection and analyses of report data to obtain more in-depth insight of Space Grant success and impact.

Proposed Evaluation

Ultimately, the present technical assistance sought to propose a plan by which Space Grant could be evaluated. Specifically, the purpose of the proposed evaluation is to document and assess the implementation, outcomes, and impacts of the Space Grant Program during the five-year period 2010-2014. The proposed evaluation is framed by a series of evaluation questions and a

preliminary Logic Model (presented earlier) that identifies critical inputs, activities, outputs, and outcomes as well as their relationships. Based on the feedback received from stakeholders, the following are the evaluation questions (with explanations of why and how they were modified from the original evaluation questions provided).

Proposed Questions

EQ1a. Were Space Grant activities, as defined in the 2010 solicitation, carried out in compliance with Public Law 100-147?
EQ1b. Were Space Grant activities, as defined in the 2010 solicitation, carried out in alignment with the priorities of NASA OE and NASA research and technology development?

Explanation: EQ1 was modified to address the double-barreled nature of the original question (two questions being asked in one question). Further, stakeholders suggested that the elements of the Public Law, as well as NASA education priorities and NASA research and technology development priorities be fully defined and operationalized for properly addressing this question. Finally, stakeholders opined that because priorities changed annually during this time period (2010-2014), it may be difficult to measure compliance and alignment.

EQ2a. To what extent are funded activities engaging the intended populations (i.e., diverse students, faculty, and institutions) as defined in the 2010 solicitation?
EQ2b. To what extent are funded activities meeting program goals as defined in the 2010 solicitation?

Explanation: EQ2 was modified to address the double-barreled nature of the original question. Further, stakeholders suggested it will be important to operationally define "diversity" as it relates to the student, faculty, and institution.

EQ3. To what extent do the methods of soliciting applications or requests, review of those requests, and awarding and distributing Space Grant funds at the National as well as consortium levels support the quality of the results?

Explanation: This question was modified to include a suggestion to examine how the methods employed at the National as well as consortium levels affected results. The term "quality" was also identified as needing definition with suggestions related to outputs and outcomes (e.g., publications, presentations, conferences; dosage and exposure; student engagement in hands-on activities; and success of students in STEM majors and careers).

EQ4a. What "promising" practices exist in Consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields?
EQ4b. To what extent are these practices related to the quality of results?

Explanation: EQ4 was modified to address the double-barreled nature of the original question. This question was further modified to change "effective" practices to "promising" as there is no

effectiveness data in order to address this contract. Finally, the term "quality" was also identified as needing definition with suggestions related to outputs and outcomes.

EQ5. What have been Space Grant's major contributions to NASA's education mission?

Explanation: No changes were suggested by stakeholders for this evaluation question, yet the term "major contributions" needs definition. One suggestion is to look for changes in NASA OE mission, policies, or practices that may have been influenced by Space Grant activity.

EQ6. Given the national investment in Space Grant program, what, if any, new approaches to the management of Space Grant program should NASA consider for the future?

Explanation: No changes were suggested by stakeholders for this evaluation question, yet stakeholders suggested a formative approach to measure consortia annual progress and practice at the mid-year point to provide feedback and permit performance improvement (possibly defining a "promising" practice).

EQ7. In all, what are the challenges, barriers, and constraints encountered in ensuring high-quality results?

Explanation: No changes were suggested by stakeholders for this evaluation question, yet the term "quality" requires definition as stated in comments related to EQ3 above.

Evaluation Framework

In order to answer these evaluation questions, an evaluation framework will be developed that captures how state consortium will be selected for the clustered multiple case studies (sampling plan), how data to answer the evaluation questions will be collected (and from whom), how the collected data will be analyzed to answer the evaluation questions, and how the findings from the analysis will be reported. Evaluation frameworks serve to organize key elements of an evaluation plan including: evaluation questions and the approach to responding to each question; evaluation design; description of the specific program activities that are the focus of the evaluation study and anticipated outcomes based on existing research evidence; sampling strategy (as appropriate); strategy for engaging stakeholders to participate in the evaluation study; data collection methods; and data analysis methods appropriate to responding to the evaluation questions. The following exhibit presents a preliminary evaluation framework for the Space Grant Evaluation.

Exhibit 2 - Evaluation Framework

Evaluation Question	Type	Evaluation Approach	Data Collection Approach	Data Analysis Approach
EQ1a. Are Space Grant activities being carried out in compliance with Public Law 100-147?	Normative	Discrepancy Evaluation—requires operationalizing PL requirements.	Gather all available Space Grant activity descriptions from APD Reports, OEPM data, and State Consortia records	Qualitative—Comparison of documented Space Grant activities against PL requirements
EQ1b. Are Space Grant activities being carried out in alignment with the priorities of NASA OE and NASA research and technology development?	Normative	Discrepancy Evaluation—requires operationalizing NASA education and NASA research and technology development priorities.	Gather all available Space Grant activity descriptions from APD Reports, OEPM data, and State Consortia records	Qualitative—Comparison of documented Space Grant activities against NASA education and NASA research and technology development priorities
EQ2a. To what extent are funded activities engaging the intended populations (i.e., diverse students, faculty, and institutions) as defined in the 2010 solicitation?	Descriptive	Descriptive assessment of available program data.	Gather all available Space Grant funded activity descriptions and engaged populations information from Student Data Tables, ADP reports, and selected OEPM data	Quantitative--Descriptive analysis of number/percentage of populations engaged
EQ2b. To what extent are funded activities meeting program goals as defined in the 2010 solicitation?	Normative	Discrepancy Evaluation—requires definition of 2010 solicitation goals.	Gather all available Space Grant funded activity descriptions from Student Data Tables, ADP reports, State Consortia records, and selected OEPM data	Qualitative--Comparison of documented activities and 2010 solicitation goals
EQ3. To what extent do the methods of soliciting applications or requests, review of those requests, and awarding and distributing Space Grant funds support the quality of the results?	Descriptive	Multiple Case Study	Gather all available Space Grant funded activity descriptions from Student Data Tables, ADP reports, and selected OEPM data; operationalize "quality of results"	Quantitative—relationship between methods and quality of results; Qualitative—examine association of methods and quality of results as reported by Consortia
EQ4a. What effective practices exist in Consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields?	Descriptive	Multiple Case Study	Gather all available Space Grant activity descriptions from APD Reports, OEPM data; Interviews with State Consortia Directors	Qualitative--Descriptive analysis of Space Grant Consortia practices identified as "effective" and their relationship to university resources expended
EQ4b. To what extent do these practices ensure the quality of results?	Cause & effect	Multiple Case Study	Gather all available Space Grant activity descriptions from APD Reports, OEPM data	Qualitative—descriptive relationship between effective practices and quality of results
EQ5. What have been Space Grant's major contributions to NASA's education mission?	Normative	Discrepancy Evaluation—requires definition of "major" contributions	Gather all available Space Grant activity descriptions from APD Reports, OEPM data	Qualitative—Comparison of documented Space Grant activities against NASA education mission
EQ6. Given the national investment in Space Grant program, what, if any, new approaches to the management of Space Grant program should NASA consider for the future?	Descriptive	Summative Evaluation	Gather all available Space Grant activity descriptions from APD Reports, OEPM data; Interviews with State Consortia Directors	Qualitative—identification of new approaches to the management of Space Grant program
EQ7. In all, what are the challenges, barriers, and constraints encountered in ensuring high- quality results?	Descriptive	Multiple Case Study—requires definition of "high quality" results	Gather all available Space Grant activity descriptions from APD Reports, OEPM data; Interviews with State Consortia Directors	Qualitative—identification of challenges, barriers, and constraints encountered in project activities yielding high quality results

The evaluation plan also includes the formation of an expert stakeholder panel that will serve to help develop and review the progress of the evaluation, including sampling design, data collection tools and field procedures, interim and final results, and reporting.

The proposed evaluation design is a rigorous mixed/multiple methods design, involving secondary analysis and clustered multiple case study approaches to answer the descriptive, normative, and cause-and-effect evaluation questions. This design capitalizes on both the availability of consistently collected data across all participants, as well as in-depth study of smaller groups of selected participants (5-7 state consortia) who are similar on key dimensions (such as program focus). The proposed design emphasizes efficiency and minimizing data collection burden on state consortium.

Evaluation questions about compliance (EQ1) and engaging the intended populations (EQ2) will be addressed across all 52 state consortia through secondary analysis of common data elements found in OEPM, including (1) Institution type of affiliates and if they are a Minority Serving Institution, (2) The number of fellowship/scholarship recipients, as well as their demographic and other information, (3) The number of students who received significant investment and their demographic and other information, (4) The number of new or revised courses, and (5) Publications, invited papers, papers presented, patents, technology transfers, and additional grants and their amounts. These secondary data will be supplemented with information maintained by state consortia regarding their activities and results (state consortium archival data) and primary data gathered from state consortium staff, affiliates, and partners for the expressed purpose of telling the state consortium's story about activities and results. These more in-depth data, collected across samples of 5-7 state consortia with a common focus, will be used to address questions about effective practices (EQ4), major contributions (EQ5), and challenges, barriers, and constraints encountered in ensuring high-quality results (EQ7).

All in-depth data collection (e.g., staff interviews, archival record review, and focus groups with affiliates and partners) with more than 9 subjects will be reviewed and approved by an Institutional Review Board (for adherence to the Protection of Human Subjects); rigorous informed consent procedures should be utilized. Data analysis will include descriptive statistical analysis for most quantitative data (e.g., counts, percentages, ranges, etc.), as well as content analysis and ethnographic analysis for the qualitative data (e.g., thematic analysis of interview and focus group transcripts and ethnographic analysis that focuses on constant discovery and constant comparison of relevant situations, settings, styles, images, meanings and nuances). The aim is to be systematic and analytic, but not overly rigid as to miss the diversity and uniqueness of state consortium implementation and results.

The proposed evaluation is anticipated to require nine months to implement completely. The first two months will be spent refining the evaluation design with the expert stakeholder group, developing the secondary data analysis models, conducting preliminary interviews with state consortia staff, and preparing primary field data collection protocols and tools for review and approval. The following 4 months will be spent gathering primary and secondary data, and the last three months will be dedicated to preparing the clustered multiple case studies, summarizing the findings from the quantitative and qualitative data, and preparing the final report.

FULL REPORT

BACKGROUND INFORMATION

The National Aeronautics and Space Administration (NASA) Office of Education (OE) is responsible for the development and implementation of the agency's education programs that strengthen student involvement and public awareness about its scientific goals and missions. Through NASA's unique mission, workforce, facilities, research and innovations, the NASA OE inspires students' interest in science, technology, engineering and mathematics (STEM) education (100th Congress, 101 STAT. 860, Public Law 100-147 - October 30, 1987)[4].

The NASA Space Grant College and Fellowship Program (Space Grant) is one of two components of the NASA OE Higher Education Aerospace Research and Career Development (ARCD) Program. Space Grant is administered at the national level by an OE Program Manager. Space Grant is a state-based program operating under cooperative agreements with a lead university in each of the respective consortia and managed by a common director at that level. NASA funds a Space Grant *consortium* in each of the 50 states as well as each of the District of Columbia and the Commonwealth of Puerto Rico. Congress authorized Space Grant in 1987, under Title II of the National Aeronautics and Space Administration Authorization Act (PL 100-47) to increase understanding, research, development, and utilization of aerospace science and technology through the nation's universities. Space Grant provides a comprehensive federal-university partnership in the tradition of the Land-Grant Universities and the Sea Grant Colleges. Space Grant's national network presently includes over 850 active affiliates from universities, colleges, industry, museums, science centers, and state and local agencies. Although primarily a higher education program, Space Grant activities encompass the entire length of the education pipeline, from K-12 to higher education to informal education. Notably, a Strategic Plan issued in 2012 by the Space Grant State Director Goals and Objectives Subcommittee identifies actions Space Grant consortia assert they should take to improve their effectiveness over the next decade.[5] In its enabling legislation the National Space Grant Act in 1987, Public Law 100-147, Congress stated the goal of Space Grant Program to be to "contribute to the nation's science enterprise by funding education, research, and public service projects through a national network of university-based Space Grant consortia". The following are the objectives of Space Grant, as derived from the legislation:

i. Establish and maintain a national network of universities with interests and capabilities in aeronautics, space and related fields;
ii. Encourage cooperative programs among universities, aerospace industry, and Federal, state, and local governments;
iii. Encourage interdisciplinary training, research, and public service programs related to aerospace;
iv. Recruit and train U.S. citizens, especially women, underrepresented minorities, and persons with disabilities, for careers in aerospace science and technology; and,
v. Promote a strong science, mathematics, and technology education base from elementary through secondary levels.

[4] Source: NASA Office of Education Strategic Coordination Framework: A Portfolio Approach, June 2009, NASA Office of Education, NASA Headquarters, Washington DC
[5] http://national.spacegrant.org/meetings/presentations/Fall20112/SRuffin.pdf

The time period under study for this project is FY 2010-2014. The National Space Grant College and Fellowship FY 2010 NASA Training Grant Announcement (OMB Approval Number 2700-0085) identified the following *Areas of Emphasis* for Space Grant Consortia:

- "Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA related, STEM focused questions and issues and the incorporation of real life problem-solving and needs as the context for activities;
- Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines;
- Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges;
- Aeronautics research – research in traditional aeronautics disciplines; research in areas that are appropriate to NASA's unique capabilities; directly address the fundamental research needs of the Next Generation Air Transportation System (NextGen); and
- Diversity of institutions, faculty, and student participants. These areas of emphasis, as well as the others, will be used as categories for classifying state consortium activities and then sampling state consortium for the evaluation." (Education, FY 2010 NASA Training Grant Announcement)

Space Grant base awards have historically operated on five-year proposal cycles. NASA also provides Space Grant cooperative agreements and grants outside of the traditional base awards. These other opportunities vary in length and performance periods. When the proposals are approved, each Space Grant consortium receives funding to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure; education; public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Subsequent funding is contingent upon satisfactory annual progress reporting throughout the five-year cycle. The 52 consortia are grouped into three types of consortia based on capacity, merit, and programmatic focus – *Designated*, *Program Grant*, and *Capability Enhancement*. Designated and Program Grant consortia focus on all three main components of the Space Grant program – education, research, and public service, while Capability Enhancement consortia are directed to place more emphasis on education and research activities. Each consortium is required to provide 1:1 non-federal cost share for all non-fellowship/scholarship program dollars. Consortia submit annual progress reports, program plans, budgets, and enter activity and outcome data into the web-accessed OE Performance Measurement (OEPM) database.

TWO PHASES OF THE TECHNICAL ASSISTANCE PROJECT

In September 2014, The NASA OE contracted with Paragon TEC to provide technical assistance (**Phase I**) to support future assessment of results of activities funded through the National Space Grant College and Fellowship Program FY 2010 NASA Training Grant Announcement (OMB

Approval Number 2700-0085). This grant competition awarded five-years of funding (2010-2014), totaling $170,000,000, to 52 Space Grant Consortia. These state-based, university-led Consortia constitute a national network of projects. These projects, executed through the Consortia, represent the primary population examined in this study. Phase I of the Technical Assistance Project began in October of 2014 and ended June 2015. This technical assistance task order had three primary objectives:

i. To fully document the current SG program model, including inputs, strategies/activities, outputs, and short-, intermediate-, and long-term outcomes in consultation with the SG stakeholder community;
ii. To conduct an assessment of performance data, reporting and program documentation held by SG consortia and the NASA OE to ensure that appropriate, valid and reliable data are collected to document SG strategies/activities, outputs, and outcomes at the consortium and national levels;
iii. To prepare a design and plan for an external evaluation study and make formal recommendations to improve NASA's performance monitoring and preparedness for future SG program evaluations based on a thorough review of previous evaluations, consultation with the SG community, and the results of the assessment of performance data, reporting, and program documentation.

Based on NASA's guidance, the groups undertaken for the Community Consultation Task were not intended or designed to be traditional qualitative research focus groups. Consequently, following the kick-off meeting with NASA leadership in October 2014, the Community Consultation effort were referred to as the *discussion groups*. Furthermore, in order to ensure compliance with the Federal regulations around qualitative research and Paperwork Reduction Act (PRA) requirements, it was the consensus of Paragon TEC's Team that the previously referenced "focus groups" in the Statement of Work (SOW) would be referred to throughout the contract appropriately as "discussion groups." As such, a protocol including open-ended questions was developed to encourage stakeholder participation in the discussion groups on the following topics:

- their current role/s and functions in and understanding of the Space Grant program model;
- how the Space Grant program has evolved over time (for those groups with a long history);
- goals and objectives for the Space Grant program including short, intermediate, and long-term outcomes as well as key strategies and activities of the program;
- how Space Grant recipients are currently monitored and evaluated (what documentation is currently required) and the strength and weaknesses of the current approach from their viewpoint and what can be improved;
- current sources of information and data used to document, monitor, and evaluate Space Grant programs;
- whether proposed evaluation questions (See Appendix A) are appropriate and realistic.

The intent of the discussion groups was to gain a better understanding of the position of the Space Grant program in NASA's broader educational agenda, identify the measurable goals and objectives of the Space Grant program, and to formulate evaluation questions for each goal and objective to be used for Space Grant evaluation later. The Technical Assistance Team also aimed

to learn from program staff about current approaches to monitor and assess the performance of Space Grant consortia and to evaluate the national program and gain an understanding of the performance data and reports currently collected from Space Grant consortia.

The data gathered from the Space Grant discussion groups is an important element of the exploratory evaluation approach (also known as Evaluability Assessment[6]) that is being utilized to:

(1) address the objectives, expectations, and information needs of Space Grant program managers and policymakers,
(2) explore Space Grant program reality,
(3) assess the likelihood that Space Grant program activities will reach measurable progress toward program objectives, and
(4) assess the extent to which Space Grant evaluation information is likely to be used by program management.

The summary of the topics discussed and the identification of the overarching themes presented above were important contributions to the assessment of the Space Grant's readiness for rigorous evaluation.

Consultation with the Space Grant community was a major component of Phase I. The Space Grant community input provided contextual information from key stakeholders that would be useful in the design of an external evaluation of the national Space Grant program. Stakeholders were asked about their understanding of the position of the Space Grant program in NASA's broader educational agenda, their experience measuring the goals and objectives of the Space Grant program, and their ideas for questions that would frame an evaluation of Space Grant program. The limitation for Space Grant community input was as follows:

The Space Grant community stakeholders had varying levels of knowledge about different aspects of the Space Grant Program under investigation. The Technical Assistance Team also sought to understand existing or historical approaches to monitor and assess the performance of Space Grant Consortia in order to gain an understanding of the performance data and reports currently collected from Space Grant Consortia. As a result of Phase I Technical Assistance activities, the following limitations to data quality were identified.

(1) An external evaluator will need to rely on the descriptions provided in Annual Performance Data Reports to better understand how each Consortium performed (outcomes) on the NASA priorities.
(2) Only seven of the thirteen NASA-mandated Space Grant program outcomes were related to NASA's priorities (Appendix C). These outcomes are numbered six through thirteen.
(3) Only outcome twelve (diversity - list MSIs and underrepresented minorities in Student Table) was reported with consistency over the five-years of interest to the evaluation**.** It should be noted that the focus of the evaluations was to review the consistency across the

[6] Wholey, J. S. (1979). Evaluation: Promise and Performance. Washington, DC: The Urban Institute.

data sources, and the review did not assess if the data collected were meaningful for addressing the evaluation questions.

(4) The Statement of Work for the Space Grant Technical Assistance Project required management data for the NASA-proposed evaluation, so the DQA informed very little about the data availability for the three of the original evaluation questions.

Due to limitations in the Phase I data identified above, the evaluation team concluded that additional data collection was necessary – specifically additional interviews. For instance, it was important to speak with the NASA OE Staff and some Consortia directors. It was also considered important to examine data from FY 2012-13. This led the team to embark on **Phase II** of the project (June-September, 2015), which included:

1. Refine evaluation questions which includes developing an Interview protocol,
2. Conduct up to five additional interviews with Space Grant Consortia Directors and their respective OEPM Coordinators,
3. Complete a group interview with OE staff engaged in Space Grant implementation to collect information on the current and historical perspective of Space Grant, and
4. Complete an additional review of OEPM data for FY 2012-13.

For this task, Paragon TEC reviewed the availability and quality of existing data and assessed if the data can be used for an evaluation to be conducted by external evaluators. Recommendations to improve the five-year program review, including its methods and instrumentation, are also addressed. Details of the changes recommended to methods and instrumentation are presented in detail in appendices to the report. The burden of data collection on Space Grant Consortia, as well as data validity, consistency, and comparability are all important considerations in each of the recommended changes.

PURPOSE

Based on the data collected and analyzed across both Phase I and Phase II, this report culminates with:

(1) recommendations to improve NASA's performance monitoring and preparedness for future Space Grant program evaluations, and a proposed design and plan for an external evaluation study

(2) The performance monitoring recommendations will address performance data, collection methods, and reporting procedures and provide guidelines on improving the quality of SG data. Recommendations to improve the five-year program review, including its methods and instrumentation, will be included in this report. Proposed changes to methods and instrumentation will be presented in detail in appendices to the report. The burden of data collection on SG consortia will be an important consideration in drafting the recommendations.

ORGANIZATION OF REPORT

The report begins with a section on the methodology, approach, and findings of the Phase I and II community consultation. The next section covers an in-depth assessment of the data quality of Space Grant. The final section of the report summarizes the data findings and provides recommendations regarding performance monitoring and evaluation planning. Direct quotes are included throughout the report for emphasis. No personal identifying information is included in the report. As appendices, this document includes both a preliminary evaluation plan that can be used as the basis of the next phase of evaluation as well as extensive tables detailing elements of data quality.

PHASE I – STAKEHOLDER INTERVIEWS (OCTOBER 2014 – MAY 2015)

PHASE I METHODS

The NASA Space Grant SOW identified four key stakeholder groups for inclusion in the discussion groups. They are as follows:

- Space Grant Affiliates
- NASA OE Coordinating Council (ECC)
- National Council of Space Grant Directors
- National Space Grant Foundation

As per the statement of work (SOW), to identify discussion group participants, email introductions were provided by Dr. Patricia Shaffer, Acting Director, OE, Infrastructure Division and Evaluation Manager, for the following groups of individuals to facilitate communications between the Paragon TEC staff and NASA staff:

- Leadership of the Education Coordinating Council (Donald James, Associate Administrator for the OE),
- National Council of Space Grant Directors (Dr. Stephen Ruffin, Chair),
- National Space Grant Foundation (Mark Fischer, Executive Director), and
- Space Grant Affiliates (Michael Cherry).

Paragon TEC's Team requested up to nine representatives from each group. In order to identify nine representatives from each of the stakeholder groups noted above, the Team provided the following recommended criteria below. The criterion for participants was created based on several discussions with NASA staff and through the review of evaluation reports (task b).

- Space Grant Affiliates
  - Selection criteria by type of agency/organization academic
    - industry
    - science centers
    - state and local agencies

        - other
- NASA OE Coordinating Council
    - Selection criteria by various demographic elements
        - location (north, south, east, west, and territory)
        - tenure (longest and newest)
- National Council of Space Grant Directors
    - Selection criteria by type of consortium
        - Designated consortia
        - Capability Enhancement consortia
        - Program Grant consortia.
        - Consortia within EPSCoR program
- National Space Grant Foundation
    - Selection criteria by data collection and student tracking mechanism
        - handle their own data collection and student tracking
        - previously contracted with Foundation for data collection and student tracking
        - currently contracted with Foundation for data collection and student tracking

Over the course of two weeks, between late January and early February 2015, recommendations of 59 participants were received. Based on the review of criteria, 32 participants were selected for participation. Prior to the discussion group, NASA staff and affiliates who were asked to participate in the groups were sent an e-mail from the Team describing the purpose of the groups and obtaining pertinent scheduling details needed to schedule the groups. In short, participants in the discussion groups were contacted twice via email with the initial invitation for the group they were assigned to and for confirmation of participation through a Microsoft Outlook invite. The table below provides an overview of the groups conducted.

Exhibit 3- Discussion Group Participation

Group Number and Audience	Date/Time	# Invited	# Confirmed	# Attended
Group One: National Council of Space Grant Directors	February 2, 2015 12-2pm	9	7	6
Group Two: Space Grant Affiliates	February 2, 2015 3-5pm	8	4	4
Group Three: National Space Grant Foundation	February 3, 2015 12-2pm	8	7	6
Group Four (A): NASA OE Coordinating Council	February 3, 2015 3-5pm	9	6	2
Group Four (B): NASA OE ECC (Rescheduled)	February 5, 2015 12-2pm	11	8	6
TOTAL		**38**	**32**	**24**

Discussion Guide Development

NASA provided a template to include the introduction and research questions for review by participants and the Paragon Team drafted a protocol with four topic areas:

- **Topic 1:** Space Grant program model, including goals, objectives, key strategies/activities, outputs, and anticipated short, intermediate, and long term outcomes;
- **Topic 2:** Space Grant performance monitoring and evaluation methods, data sources, instruments (including rubrics), reporting and program documentation, including factors affecting the success of performance monitoring and evaluation activities;
- **Topic 3:** Proposed evaluation questions prepared by the OE; and
- **Topic 4:** Data sources relevant to the evaluation questions, particularly those that are different than data used for past assessment studies.

Greater detail regarding these four discussion topics can be found in Appendix B. The discussion guide was developed to ensure the moderators' ability to obtain information from participants around each topic area without asking the same questions more than once.

NASA did not consider the involvement of their Institutional Review Board (IRB) to be necessary for these discussions. Thus, the protocols developed for these discussions were developed with this in mind. However, the subcontractor's (PIRE) Federal Wide Assurance (FWA00003078) under the U.S. Department of Health and Human Services (DHHS) human subject protection regulations (45 CFR 46), requires that if PIRE is engaged in human subjects research, it must obtain an assurance of compliance approved by the Office for Human Research Protection (OHRP). PIRE submitted the approved protocol through its IRB in early December 2014. The discussion groups were considered exempt from human subjects review by the PIRE's Institutional Review Board on January 4, 2015. Further, no consent forms were deemed necessary for participants of the discussion groups.

Each group was scheduled to last no longer than two hours. The duration of these discussions ranged from 60 minutes to 98 minutes, depending on the participants' knowledge of Space Grant and other topics areas discussed. The average length of the discussions was 79 minutes.

PHASE I DATA ANALYSIS

Each group was audio recorded and a third-party transcription service was used to provide transcripts for the group discussions. Hand notes were also taken during each discussion group. Two members of the Paragon TEC team generated the themes across the discussion groups. This task was completed manually by reading the texts a few times and coding them for common themes within and across the groups. Then, themes most frequently mentioned or identified across and within groups were compiled by discussion group topic area and presented accordingly.

It should be noted that due to the length of the contract and discussion groups format, these findings represent an overarching report of the four discussion groups conducted from February 2-5, 2015. Additionally, the in-person focus group conducted by NASA in September 2014 with a variety of stakeholders was considered where appropriate as secondary data for the community consultation task.

PHASE I FINDINGS

The following is a summary of the results of Phase I organized by discussion topic.

Topic 1: Program Model, Goals, Objectives, Key Strategies, Activities, and Outcomes

Across groups, there was a consensus around NASA's goals and objectives of Space Grant (see Appendix C). Space Grant was described, by participants, using phrases that indicated themes of **scope** and **collaboration**, such as: a national program, consortium of states, and a cooperative network. Across groups participants noted that Space Grant has evolved over time to diversify into a unique program that supports a multitude of activities producing outcomes specific to each state's NASA focal area. Specific program activities, with the exception of NASA sponsored research and under-represented student and workforce recruitment and development, were noted as being difficult to note across Space Grant due to the diversity across states noted previously. Specific outcomes mentioned included comments around increased graduation rates of underrepresented populations in STEM related degrees and entrance into STEM employment and increased NASA research efforts and presence in states including those without NASA centers. No changes were noted to the perception of the Space Grant model over time were noted. Other themes that emerged quickly were **support** and **diversity**. One participant comment that illustrates these themes is:

- In other words, something that's most unique about the Space Grant Program is that it's a national program with shared goals across the country where each state consortium contributes in a unique way to meeting the goals of the National Space Grant and that sets up very different program models across the country to utilize some state resources to best meet individual state needs all in the arena of working with NASA education to meet NASA program goals. (Space Grant Foundation)

One explanation that participants opined regarding the theme of diversity referred to the broad scope of NASA, itself.

> *It varies, and it's quite diverse. If you look at the NASA mission, because there are elements of biology and physics and chemistry and so forth, our research projects are going to vary quite a bit, from projects that deal with physiology under low gravity conditions, to atmospheric measurements on Mars, to any number of different things. (Space Grant Affiliates)*

It should be highlighted that the ECC group noted having limited knowledge regarding the specifics of the wide assortment of Consortia activities, which leads into another important difference between the NASA as represented by the ECC and Space Grant. The independence of the various States within Space Grant was noted as a weakness by the ECC group but was noted as strength by both the Space Grant staff and National Space Grant Foundation groups. This dichotomy is illustrated by the following contrasting comments:

- Basically, each of the states are going to get money for anything they want. NASA does not have the control it should have over the individual entities because it is a congressionally mandated program. Concept: good that it's in all of the states but

implementation, bad. It is perceived that from the space grant point of view, it's as free money. (ECC)

-
- One of the most specific characteristics that make the Space Grant model effective is the state-based approach where all 52 consortia can set up their own plans on how they want to accomplish the NASA goals. NASA for the most part has allowed us to execute programs at a state level however we see fit. (Space Grant Foundation)

This issue was often related to funding, which was mentioned across all groups in varying contexts. Both the Space Grant Affiliates and Space Grant Foundation groups reported that problems were caused by variations in funding cycles and delayed release of funds and award notification, such as the comment below:

- We grow our programs to be able to respond to NASA OE priorities. We institute new programs and then we find that our budgets get cut soon after, within a few years after and so, we find that what were very successful programs, we no longer have enough funding for yet we still have the requirement to reach certain goals. So, it does make it challenging but I think it would be nice if we could know what our funding stream is and be able to plan well ahead of time. (Space Grant Foundation)

Together, it becomes clear that there is a strong divergence of themes in that **NASA representatives want more control,** particularly over Space Grant expenditures, but **Space Grant consortia representatives contrastingly want freer reign**. The following two quotes highlight the conflict:

- There has been a recent trend to take a large chunk of our budgets and complete those at a national level on goals and objectives of interest to NASA education and not really allowing the states to set forth our own goals for that chunk of money. I think that's a largely ineffective approach to the model that can be approved upon. (Space Grant Foundation)
-
- I think that might mean that they have too much autonomy in determining what the priority for NASA are whether than working within NASA and the missions in order to identify what kind of research ... When they do a call for proposal, I work with some of them, and they'll get proposals from outside entities for projects that they want to work on. You can see a NASA connection but you can't figure out if NASA actually values that connection. They're supporting research that is NASA related but not necessarily NASA research. (ECC)

As a specific example, one Space Grant participant remarked on the perceived burden of NASA funding requirements:

- The professors that we work with don't take any salary for the work that they do. The majority of the funds go to the students for their scholarships and fellowships. It goes to materials and supplies to support the projects that they work on and the labs that are being

used are provided free of cost. The professors are free of cost. Why do we need to document that cost sharing every year? (Space Grant Foundation)

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The need for an increase in funding to expand the reach of Space Grant was noted across groups; but, again, there was a clear contrast between stakeholder groups. The NASA ECC group emphasized a need for sustainability and funding sources other than NASA, but a Space Grant participant posited the following in relation to funding levels for students specifically:

- They're imposing definitions with funding amounts attached that are high levels of funding -- higher than the going rate paid for such awards. In our states, based on our state economies, we are routinely paid so that we can support fewer students to comply with term definitions. (Space Grant Foundation)"

Another, more general, funding barrier that was echoed:

> *I agree with the point that the funding level which has fluctuated tremendously from year to year and uncertainty with that makes it difficult to leverage the types of things that we've got going on and ensure that they can grow or grow to meet the STEM goals, the national STEM goals which are pretty challenging and which we are having a contribution to that we want to make sure that we have a strong contribution to those CoSTEM efforts. (Space Grant Directors)*

One participant offered the following opinion regarding the root of the problem.

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- I would say that the other piece is there is they… are funded by Congress and they are funded by the states. Therefore, they even get plus ups or increases when they don't even ask for them because it looks like there is a tendency to see them as a way of providing direct aid to states as opposed to national efforts. I think that creates part of the problem as to whether NASA can utilize Space Grant to achieve its own goals and directions. I think we're at a crossroads there as to whether those space grants are actually going to support the work of the mission directorates and therefore partner much more closely with the mission directors or whether they're just going to be viewed as almost entitlement programs to the states because everybody has one. They don't rely on NASA to suggest what the budget should even be for them at the Congressional level. (ECC)

Topic 2: Space Grant Performance Monitoring and Evaluation

As in the first topic, there were discrepancies between groups regarding the methods by which Space Grant is evaluated. The ECC group expressed a feeling of limitations to information regarding the current monitoring and evaluation methods and data collection efforts of Space Grant beyond the annual report provided by grantees that is used for OEPM. One participant suggested a possible root cause thusly:

- One current experience that I think that all of us have appreciated is progress reports. It has been an opportunity to tell some of the personal success stories and such that we aren't able

to tell in an OEPM database reporting instrument, but the most current guidelines for the progress report limited submissions to eight pages long with many, many, many things that are supposed to be included in each section of the report to report adequately. I know that through time with many of the types of review reports and such that we have written, we spend a huge amount of time trying to cut content to make page limits. (Space Grant Foundation)

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However, these limitations do not in any way suggest that data collection does not occur. The three Space Grant groups had quite a bit to say about monitoring and evaluation. In particular, there were several types of data that were commonly collected. Participants noted having mechanisms to readily collect this information to demonstrate program success however no additional information was mentioned regarding the ease or lack thereof collecting data. As mentioned in a later section data challenges noted pertained specifically to the burden of reporting the data collected. Those three groups discussed the following kinds of data collection sources and types data:

- Program impact
- Number of students reached
- Demographic data
- Funding support categories and Space Grant funding spent
- Career and degree tracking and completion
- Number and effectiveness of collaborations
- Space Grant course development
- Number of hours for significant award
- Performance outcomes
- Longitudinal student tracking

Participants from the three Space Grant groups further reported that data was collected using the following data collection sources:

- Research presentations at annual state meetings
- Student data tables using excel spreadsheets
- Surveys
- Summary narrative reports
- Forms such as matching certification
- Awardee reports
- Final/annual performance report
- Progress reports
- OEPM data entry system
- Social Media
- Self-reporting from students
- WorldCat data for career and degree tracking
- Application data

In fact, a variety of participants suggested that too great an administrative burden placed on grantees due to amount of data required to be collected. Furthermore, some participants lamented a lack of feedback regarding program evaluation. One participant had this to say:

- I was going to say that, apparently, people called our affiliates and asked them if they started the program and these general questions and then, I know some of our affiliates gave us low marks but it was never clear why. We never get any feedback on exactly what they thought was wrong with the program. (NASA In-person group)

So, it is clear that evaluation activities occur in both NASA and Space Grant groups, but a theme of **limited communication** in both directions regarding evaluation became apparent.

Further analysis of the discussion transcripts revealed that some participants lay the blame for this limited communication on technical limitations. For example, in OEPM participants remarked an inability to change past reports to correct mistakes or add updated information received after the reporting period ended. This made it difficult to link impact data to project activity because they happen in different reporting periods. As was briefly touched earlier, many expressed difficulty fitting all data into the data categories required for reporting. One participant suggested the following explanation for Space Grant data collection forms in general:

- I think part of why it's a work in progress is that NASA is asking for an incredibly wide array of programs to be reported through the same instrument and based upon the same form. There was a conversation earlier about how do you tell the story of what is really going on in your state. I think with the wide array of programs that people are being asked to report on, it's very, very difficult to get the collected information correctly to be able to find the right stuff, to be able to tell the right story because the story is told differently for every program. (Space Grant Foundation)

In addition to having to provide different data via the same report, discussion also indicates that there exists a requirement to report the same data in different reports. This mismatch between data and the reporting form may not be insurmountable, but participants argued that it is only exacerbated by limiting the number of people who have access to enter data into OEPM as well as the limited timeframe during which data can be entered, especially given that this timeframe does not match the academic school year. One participant summarized these issues as follows:

- I realize that the challenge with all the different fiscal years and people executing programs at different times and reporting and putting data in at different times that it seems that the data that we provide never gives headquarters a complete and accurate picture at any given time and so they keep asking for specific data request or specific needs. We're always responding to data requests. They may be on their way with the new OEPM that's open year-round and accessible year-round. If a structure were in place, we could probably give them a better picture of how effective we are. I think that's the challenge. (Space Grant Foundation)

Discussion of the shortcomings of OEPM was not limited to access policies. One participant shared this opinion of the technical faults of the system:

- Two years ago, OEPM experiences was rather like healthcare.gov. It was first introduced, it was a pretty horrible experience to try to use because it was so filled with bugs and problems and, et cetera. It has been improved since then but it's still certainly a work in progress. (Space Grant Foundation)

Altogether, members of the three Space Grant discussion groups had numerous recommendations regarding evaluation. Some participants suggested that the evaluation framework could be supplemented by an external evaluation of Space Grant by a highly recognized group like the National Research Council. Others suggested that incorporating Geographic Information System (GIS) technology into the OEPM would improve Space Grant's capacity at data management, data mining, and geographic representation. Discussion participants desired that more people per grantee site be granted to access OEPM in order to enter data as well as allowing data entry year-round. Requests were voiced for the ability to make additions and modifications to OEPM reports after the fiscal year in order to update information occurring after the reporting period ended. It was suggested that OEPM might be extended with the capacity to provide grantees a comparison between their respective states as well as to the national standard. Additionally, it was argued that aligning the reporting schedule to the academic school year would streamline the reporting process, particularly if grantees had the ability to pre-populate data entered from previous years. Finally, participants from the three Space Grant discussion groups requested that NASA communicate changes to mandatory reporting and required fields to all key stakeholders involved in data collection and reporting

Topic 3: Proposed Evaluation Study Research Question Review

Appendix C contains a list of preliminary research questions for a possible future external evaluation of Space Grant. Discussion occurred regarding the viability of this list. It should be noted that there was consensus across discussion participants that it would be both difficult and unnecessary to rank or prioritize the questions on the list as they were all deemed equally important. The first major result of discussion was the development of suggestions for additional questions as well as revisions to the existing questions. For example, one participant wanted the questions reworded so they are not "not posed in such a way that they asking if we do comply with these things, we have no choice in complying with these things. It's required." Although, this particular recommendation certainly carried the assumption that all stakeholders do everything that is required of them, the point was articulated that it would be more politic to ask "how" – as opposed to "whether" – grantees were in compliance. Possible additional questions forwarded during discussion included issues of degree completion, career matriculation, and identification of successful program models.

Several participants offered commentary and revisions around question 1 from Appendix C. The first major comment applicability of the legislation referenced in the question.

- I went and found Public Law 100-147. I read through it. I found that only Title II really concerns us of that law. I pulled out sections 203 and 209 that I felt or sorry, 203, part of 204 and 209 that I felt really was something that we could address because the whole law doesn't fully concern Space Grants. It's related to NASA with that Space Grant. (Space Grant Foundation)
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It was not within the scope of the present document to determine the accuracy of the above interpretation, though such a legal analysis may be beneficial because more than one participant was unclear on how Public Law 100-147 applied, as illustrated in the following quote:

- I think it would be nice if when asking the question number one if the key points of Public Law 100-147 could be illuminated. I said illuminated not eliminated. I think that would be nice. I also went in and found the priorities of NASA OE which we see in every one of our proposals because in every solicitation they are restated because NASA OE would like us to address these, so we're aware of where those are, but I think it would be nice when asking that question to list what they are, and then for NASA Research and Technology Development, those are really based on the priorities of each mission directorate. (Space Grant Foundation)
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Furthermore, it was argued that the multipart nature of question 1 was problematic.

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- Is it in compliance with public law? […] Does it align with the priorities of NASA education? […] Question 3, alignment with the priorities of NASA research and technology development. […] It needs to be clarified and suggest breaking that up in to I, IA, IB and IC or something so that it isn't just a straight yes or no. (ECC)

Altogether, it was clear that the first question was most in need of revision. Multiple participants in the Space Grant Directors group noted that questions numbered 2, 4, and 5 help measure program impact. Across groups participants began to consider possible answers to the proposed questions. With respect to question 5, several items were identified as possible main Space Grant contributions to NASA's education mission:

- Increase the number of students engaged in STEM and further student advancement in STEM
- Provide professional development for educators
- Increase the number of people engaged in NASA research
- Inspire STEM academic careers
- Provide economic impacts on consortia state workforce
- Expand the diversity of the talent pool pipeline from education into industry

Likewise, participants noted numerous challenges that may be answers to question 7. One potential challenge was the growing burden of reporting, specifically increasing complexity and duplication of reporting. Poor communication between Space Grant consortia and various NASA entities, mission directorates, and NASA centers was another challenge identified. One participant opined:

- Sometimes, I feel that when they're doing such reviews, the wrong people are being questioned…people that are routinely queried and questioned about a state's Space Grant accomplishments are affiliate representatives for example and state managers whereas there are an army of researchers in our state who've participated in the Space Grant Program in keeping with the goals of the National Space Grant Act that have long time experience with the program and I think could speak well to some of these questions. (Space Grant Foundation)

Time constraints for reporting and conversations were another hurdle. Reflecting on the discussion at hand, one participant explained:

- For example, it feels like this meeting today is an important one yet the timing was right in the middle of the time when most states are having to prepare APD reports and also have three-year proposals delivered to NASA in the next few weeks. So, it's come at a time when I think people from across the country are working days, nights, weekends trying to keep up with reporting, proposing and that kind of has been the model for working with Space Grant. Sometimes if timing could be better, participants could do a better job. (Space Grant Foundation)

Unsurprisingly, funding issues such as uncertainty and sustainability was another identified challenge. Each of these should be considered in future external evaluations.

Topic 4: Performance Data Reporting and Data Sources for Evaluation

Although participants generally reported no issues with data definitions and reporting, a few definitions and categories were highlighted as causing confusion. For example, given the dual role of university faculty, there was some difficulty in making distinctions between higher education and research infrastructure reporting. There was also uncertainty regarding whether any given publications were the direct result of Space Grant. Other issues included the formal definition of a fellow as well as how to document federal funding from sources other than NASA. Discussion touched upon the possibility that some demographic data currently required may be too intrusive to gather from volunteers.

One positive result of the discussions is that it was clear that no participant in Space Grant groups reported any difficulties in reporting expenditures. Several noted using their grants and contracts office and finance office to collect these reports, saying things such as, “None of us are novices to federal reporting and grantsmanship [sic]. One would expect us all to be quite proficient to identifying these categories and how the data should be reported.” However, the ECC group noted not having enough experience with data reporting to provide insight on this section. One ECC participant admitted:

- I would say no experience. That's all been a headquarters function. I don't think we know enough about what data is gathered or how it is used besides it gets thrown into OEPM, we presume, and it's used for the final metrics for the office of education as to how we're meeting our goals. To say anything about whether the right stuff is being gathered or not or how it's being gathered, I don't think any of us really deal in that area. (ECC)

Despite this, participants in the Space Grant Directors group provided the following recommendations regarding improvements for reporting:

- “Share, roll up the results as we discussed earlier and share the whole national impact out and be sure that we have access historically to our data.”

- "In a number of cases, we submit a lot of data in OEPM and we can't see it afterwards and can't make corrections to it if the need arises. That's very important to be able to see what we input and even when we can no longer make inputs to it."
- "Sometimes, the same information is being requested in three different ways when one would do so maybe a review of the data being requested from the vantage point of potential redundancy or to what is the data being used and why is it relatively important"
- "…every year, we report data. After five-years for the grant period … The software that they have, OEPM, should be able to accumulate all of this. Why do I need to re-report, put it all together and do it again at the end of five-year evaluation? I'm being evaluated every year. If you want to wait till five-years, maybe if I'm doing a bad job, maybe it's too late now. It means every year, we're being evaluated and we shouldn't be evaluated again and again and again."

PHASE I OVERARCHING THEMES

In addition to the topic area summaries and highlights provided in the section above, there were several conclusions and overarching themes that arose across the groups, not specifically associated with the four topic areas specified in the SOW.

Communication

Across the four discussion groups, there were varying comments on how effective Space Grant communication has been, currently works, and can improve in the future to address a barrier noted by many for ensuring the success of the program. Overall, commentary from participants described that more effective, timely, and perhaps more frequent transparent communication was needed moving forward. At the ECC level, participants noted wanting and needing to know more about the Space Grant activities so they could provide answers to simple questions such as the ones they were unable to answer during the group and at the Space Grant Director, Space Grant Foundation, and Space Grant Affiliates level they noted wanting more responsive communication from NASA and the OE to assist them with Space Grant efforts in their state. The following subsections provide a list of pointed comments within this theme.

Secondary NASA In-Person Group

- *Basically, we have a communications problem. That's what we're saying. We need a better flow. Also, I find that a lot of times, when we want to find out information, we have to email each other as opposed to headquarters because the directors will respond, so that's where we're getting the answers from and then people will like double check and try to, you know, and it shouldn't be like that. Some stuff should have been communicated by headquarters in the first place.*
- *I would like this evaluation to have one-page summary that goes to all the NASA leadership, particularly the OE AA, and they read that one-page summary and they all realize that if they were to have an input into a state and get the maximum efficiency for their dollars or ideas or concepts that they should come to that central Space Grant office. We can be, and should be, the conduit for NASA STEM at the state level. I've had too many*

instances where I've had multiple contacts from NASA in my state and I find out about this after the fact or a couple days before whereas I know what institutions are working on which projects and where. If the AA or these NASA headquarter types were to come to me, I would be able to save them a lot of time.

-

ECC Group

- *However, I do express a concern and that is obviously where we are closely aligned with a particular state, there tends to be a stronger relationship, even a stronger focus on the NASA mission, the further I am or my center or research is away from that particular state is the more difficult it is to have the kind of communications that allow us to better align ... or them to better align with us. I don't know how we address that.*
- *Can I add that if the education directors, as a group, are unclear of the answers to this and other questions then it isn't that things aren't being done I think but maybe there is just a lack of communication or something. They should be well aware of what's being done. There's some kind of a failure possibly at the NASA level of communication. I don't know what it is exactly but it seems like a director should know. Further down in the chain, maybe I wouldn't know. It would seem that maybe additional communication and transparency around all this would be in order.*
- *I would say in general I hope ... I wouldn't want to take away from the discussion that space grant is not a viable entity I think that our inability to answer some of the questions and not show some of the benefits from it should not be taken to mean that it should be done away with as opposed to anything that can pull the 50 states and the territories together is probably at best underutilized by NASA but it would be hard to replicate that if we didn't have it.*

Space Grant Directors Group

- *I think in the past, there's been very effective communication from Space Grant headquarters via national and regional meetings about the changing priorities at NASA and the directors are there. I think they soak it all in even though sometimes it makes more work for them. Then, they take those priorities back to their states. There's been an effective top down and bottom up system in place.*
- *The growth of the interactions between the different Space consortia were set up as independent grants with no actual lines of communication set by NASA itself. Those, we have evolved ourselves or directors between them that have done this over the years to a remarkable extent.*
- *One question I have regarding OE programs is I don't really know what, other than Space Grant, is going on in my state. We're only part of the OE budget but I think there could be better coordination and notification between the OE and the Space Grants as to other programs that are going on and how we could all work together better.*
- *Along those lines also, the interaction that we have with the mission directorates as well and other aspects of NASA that are not directly in the education line could be strengthened. We have working groups in which we do what we can to reach out to the mission directorates to help advertise things that they've got going on and to let them know what*

activities we have but growing that link a little better with the mission directorates and even with the centers overall, the education programs with the centers, those are areas for potential growth.

- *Another communication element that I would address that maybe existed earlier in the Space Grant program which was one of more general open communication and sharing just as I would have a staff meeting and just let people know what's going on, what's up, have some real dialogue, that's missing. Being able to do that in a very open way would really contribute to effectiveness of communication I guess is what I'm trying to say.*
- *Right now, I have absolute confidence that if I pick up the phone and call any one of my 52 colleagues, I'll get a callback within an hour or two or three. I have absolutely no confidence that I would get a call back from NASA headquarters. That's been a longstanding path. I do agree it increased in its quality. I agree that the current leader has appropriately delegated to some of her staff the authority to communicate with me. At least now, I'm confident that I'll get a callback within a couple of days which is an advantage but it is only a relational network of less than 100 people. I think a phone call or an e-mail from me as one of the directors to my program manager should at least be responded to. It is in all of my other federal grants anyway.*

Space Grant Foundation Group

- *It would be nice to have better communication on changes say to mandatory fields and other usability issues. I think we are often out of the loop on that.*
- *I think it's very exciting and I think that's why we stay in it and I think the NASA OE is doing a great job to try to be more responsive to our needs and it's really an honor to work in this program.*

Relationships

Across groups there were varying perceptions presented on the role different relationships plays in shaping Space Grant. The Space Grant Directors and participants from the secondary in-person NASA group opined that there the relationship between NASA and Space Grant should be more of a partnership – that is to say, they felt a need for more state autonomy. The ECC group expressed insufficient trust for such autonomy and, contrastingly, preferred the current grantee/benefactor relationship. In fact, the ECC was unambiguous in the desire for increased NASA governance over the states Space Grant programs.

Space Grant Directors Group

- *That's the virtue of partnerships as opposed to just issuing a call with a very detailed, described scope of work which of course is a standard way of operating in the government. In this way, we only undertake … We choose the elements of NASA's education mission that we work on, the ones that fit with our own needs in the state so we double or triple the actual amount of resources that are going into these essential needs.*
- *The programs are more mature in the relationship between the federal agency, the Cognizant Agency and their constituents. In Sea Grant and Land Grant, they see that*

partnership as a crucial to their developing their missions, their research programs, their education outreach programs.

- *There's a much more of a… a professional partnership going on versus … I think where we're at in Space Grant is it is time to reassess are we simply just a stepchild grant program that was forced upon NASA by Congress or is it time to recognize this maturity into a dynamic national network that can bring public support to NASA desires and missions. That conversation is something that I hope NASA OE can begin to have with this success that they've seen in other federal agencies specifically Sea Grant and Land Grant.*
- *Out of the 52 Space Grant directors, maybe just a couple of them are full time on this. The rest are, various amounts of time that they spent on this program and a lot of … I mean I can assure you most of our folks, they really, in terms of the money that they receive or lots of them don't receive any funding at all, they donate their time because this is a great program that we do at different states.*
- *I just really want to stress that point as well, the high degree of collaboration and the sense of family that we share as Space Grant programs across the country. If I have a question or there's a program I want to start or something I have an interest in, all I have to do is put a call out to my colleague and there's wonderful support there.*
- *The second point that I want to make is there are 52 Space Grant consortia and some of them are really brilliant people. Some of them are the best brains in science, technology, and engineering in this country. I really don't believe that NASA takes advantage of such a brainpower to design the programs and to collaborate and work with these Space Grant consortia. Sometimes, I get the feeling that they treat these people or Space Grant directors as grantee or awardee as opposed to a true partner. Thank you."*
- *I would like to agree with my colleagues who spoke first in that it is a partnership. We're putting in … I know in the case of many of the consortia, we're more than matching 100% of the funding and there is a tendency as he said to treat us like, "Oh, well we're just grantees." I think that's a mistake.*
- *Early in the program, we were treated as true partners working together to achieve goals. The more emphasis that can be put on that partnership … That is also a piece to the communication that needs to happen that I was talking about earlier, engaging, having real dialogue instead of being directed.*

Secondary NASA In-Person Group

- *There's also competition because they [OE] see us that way—that's what I understand. They see it as money taken from them, away out of the office of education even though we have our own pot of money that comes in and get added to and extends the influence of the office of education. We're not in competition. We're there to help them.*

ECC Group

- *This won't happen but it probably needs to be taken out of a grant and made into a contract. Then, NASA has full control over what the individual entities would be doing. They can still leave it open to what they're proposing but then if an entity does not do something then they can be held responsible for that. As it is now, there is a lack of responsibility or, I*

think I'm using the wrong word, as for the individual entities. In general, they are doing good things but is it integrated to the level that NASA would like? I believe the answer is no. They go off and do things that the cognizant organizations have no idea that they are doing. I would augment that to say that there just needs to be some way to ensure alignment with NASA's strategic direction and priorities.

- *From my interaction with them, I do concur that the problem is the congressional appropriation and therefore they see themselves as a grantee with NASA rather than NASA seeing them as a structure that you can actually count on to achieve NASA goals. There is much more conflict and discontent because if you deal with any budget issues then they assume you're taking their money away from them or NASA is determining priorities that they don't agree with and they should've had the right to spend that money however they determined.*
- *I think the relationship between NASA education and space grant might be described as the equivalent of a dysfunctional family. It's hard to figure out how to answer that in the context of who to say is at fault but there's just not a strong synergy of support, coherence and I think that spills over into the mission directors as well. I don't know whether we figure we're supposed to be helping them, they're supposed to be helping us where we kind of peacefully coexist. Going back to the opening comment, it's not a strong support for NASA achieving its goals that's clear from the relationship. I don't want to blame the space grant but I think it's probably a very shared responsibility.*
- *When I started supporting one of the states in my area, I should say that there were very few minority serving institutions. Once I began working with them they expanded to include a number of minority serving institutions and then there are some states that will do things with minority institutions but not include them as a member so therefore not have the same funding opportunities and other opportunities associated with membership. I think it should be looked at as to whether or not, for those where we know there are minority serving institutions, why are they not being included or is there something we can do to suggest that they include more minority serving institutions in their space grant memberships in their states.*
- *I would say from my experience, very poor. They want to go off and do whatever they are doing. During the meetings they will say that, yes, they want to partner and coordinate things. As soon as the meeting is over, they go off and do what they want to do and irrelevant of what would be priorities or integration with other ongoing NASA activities.*

Collaboration

In all the groups, the strength of collaboration across states, consortia, and industries was noted frequently as having a positive and lasting effect on Space Grant.

Secondary NASA In-Person Group

- *I think also to just underscore the statement about it being a network and going back to the idea of competing for these things. One conversation that has come up from like some of the managers and directors is that instead of spending this time in secret trying to answer these solicitations or appease headquarters and compete with each other, we could*

be building collaborations and doing some projects and sharing information, sharing approaches. So, when you have something that instead of guidelines but you say, okay, here's this money. We wanted to focus on community colleges, go. Here's the amount and this is what, you know, you could give us a directive like that, like community colleges, but then let us figure it out and then states can talk to each other, develop complementary programs, figure out what works for who and use the actual network as opposed to being like, well, there's only this pot of money. We had to compete and we had to check this box because you say so as opposed to it being an actual need.

Space Grant Directors Group

- *Also, one thing that I wanted to mention is the fact is we work together, collaborate and we learn from each other. The work is cross-breeding that happens between states and joint programs, that's very useful to every state.*
- *It was through the mentorship of other state programs like some of the voices you heard who helped me develop that network within the state to be incredibly effective and collaborative.*
- *Many times, the collaborations developed through my Space Grant organization lead into other research and teaching opportunities which were unforeseen. At the state based level for us, it was the national network which helped us develop the model for how we should organize ourselves and communicate with ourselves. Now, we're seeing the fruit of that effort that the national has experienced.*

Space Grant Foundation Group

- *I just wanted to add one more thing related to cooperative work among universities. It was stated before that the Space Grants often work together. We have an upcoming mission where many Space Grants across many states are going to be launching near space balloons to monitor the eclipse that's going to be happening. That's just one example of how not only do we work among our state-based universities and industry but also across states, across the consortia.*

PHASE II: FOLLOW-UP INTERVIEWS (JUNE-SEPTEMBER, 2015)

PHASE II METHODS

During the second phase of information collection for this technical assistance task, Paragon TEC conducted a series of telephone interviews, speaking first with NASA OE Staff to learn what Space Grant Program looked like for the grant cycle FY 2010-2014 award. Four NASA OE Staff were contacted and requested to participate in a two-hour interview to assist Paragon TEC to help: 1) refine NASA's evaluation questions for the 2010-2014 National Space Grant College, 2) further develop a Logic Model to reflect Space Grant's goals, objectives, key strategies, activities, outputs, and outcomes, and 3) learn more about Space Grant Performance Monitoring and Evaluation. Following this interview, five of the 52 SG consortia were contacted for interviews. Consortia directors and other key staff offered their feedback on the Logic Model and how it mapped to

outcomes and program strategies of Space Grant Program and their OEPM data system experiences. A final follow-up interview was conducted with two NASA OE Staff to provide clarity on information garnered from consortia interviews. These conversations, along with conversations in Phase I, the 2010 Space grant solicitation, and the data reported to OEPM system, informed development of a Logic Model and evaluation plan, which are presented in this report.

Initial and follow-up interviews with NASA OE Staff

In early July 2015, NASA OE Staff were contacted and requested to participate in a two-hour interview to assist the Paragon TEC to help: 1) refine NASA's evaluation questions for the 2010-2014 National Space Grant College, 2) develop a Logic Model to reflect Space Grant's goals, objectives, key strategies, activities, outputs, and outcomes, and 3) learn more about Space Grant Performance Monitoring and Evaluation.

Four NASA OE Staff replied with availability and the interview was scheduled. Paragon TEC developed protocols for the interview that included an introduction about the purpose of the call, confidentiality procedures, and interview questions that were focused on the seven evaluation questions and the preliminary logic model. These protocols and the Logic Model were submitted to and approved by the NASA staff. The protocols are provided in Appendix B. The protocols, evaluation questions, and preliminary logic model were all shared with the NASA OE Staff prior to the interview. Participants were provided with a handout with all seven evaluation questions, the NASA ED priorities, and Public Law 100-147 for reference during the discussion. In this section, the team summarizes the research questions and responses provided.

The Paragon TEC Space Grant team joined the NASA OE Staff via Adobe Connect and phone for the interview. All staff and some members of the Paragon TEC team were present at NASA Headquarters for the interview, which took over two hours. Topics 1 and 2 on the evaluation questions and Logic Model were covered during this time period. Due to time constraints, participants agreed to respond electronically to the questions under topic 3 concerning Space Grant performance monitoring and evaluation. The interview was recorded and transcribed later for analysis. All personal identifying information was deleted from the transcripts, and the discussion was summarized for the final report.

Within a week, the NASA OE Staff were contacted and requested to participate in a follow-up interview in order to provide Paragon TEC with additional clarity on new information they received from the Consortia Director interviews. A follow-up interview was scheduled and completed with two NASA OE Staff members on August 17, 2015. Protocols again covered an introduction with the purpose of the interview and confidentiality procedures as well as new questions pertaining to the Logic Model and Evaluation Plan. The protocols, evaluation questions, and preliminary logic model were all sent to interviewees prior to the interview. The interview lasted two hours and was recorded and transcribed. All identifying information was deleted from the transcripts and the discussion was summarized for the final report.

PHASE II FINDINGS

Topic 1: Evaluation Questions

As a reminder, the seven currently proposed evaluation questions were:

- **EQ1.** Are Space Grant activities being carried out in compliance with Public Law 100-147 and in alignment with the priorities of NASA OE and NASA research and technology development?
- **EQ2.** To what extent are funded activities engaging the intended populations (i.e., diverse students, faculty, and institutions) and meeting program goals as defined in the 2010 solicitation?
- **EQ3.** To what extent do the methods of soliciting applications or requests, review of those requests, and awarding and distributing Space Grant funds support the quality of the results?
- **EQ4.** What effective practices exist in Consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields? To what extent do these practices ensure the quality of results?
- **EQ5.** What have been Space Grant's major contributions to NASA's education mission?
- **EQ6.** Given the national investment in Space Grant program, what, if any, new approaches to the management of Space Grant program should NASA consider for the future?
- **EQ7.** In all, what are the challenges, barriers, and constraints encountered in ensuring high- quality results?

Overall, the evaluation questions included above were found to be relevant, appropriate, and tractable. However, key comments made during Phase II interviews are included here to help better understand staff perceptions of these questions and context for future evaluations. The evaluation questions were revised slightly based on these findings.

Evaluation Question 1. It was noted that EQ1 may be difficult to answer because priorities changed annually during this time period. One comment was, "In order for the program to remain relevant year to year, we would provide what would be the priorities or key areas of emphasis on an annual basis because those would shift and change as the Agency shifted." Staff also stated that priorities had to comply with the strategic coordination framework[7] (Outcomes 1-3 at the time), although Space Grant shifted away from these in 2015. The federal government also switched its focus from PART measures to performance goals and annual performance indicators (APIs) during this time.

Evaluation Question 2. It was stated that the definition of "diverse" should be clarified because diverse "does not just mean under-represented and underserved populations and it did not just mean women"; diverse also refers to the "type of institutions" and whether a wide range of institutions were represented by faculty and students in the consortium.

[7] Source: NASA Office of Education Strategic Coordination Framework: A Portfolio Approach, June 2009, NASA Office of Education, NASA Headquarters, Washington DC

One NASA OE Staff member said that Space Grant management provides assistance for Consortia who have challenges recruiting and training underrepresented minorities, including a) providing a mentor, b) offering more one on one time, and c) matching Consortia that are weaker in this area with those that have been very successful and are willing to share best practices and strategies. It was also mentioned that there are national meetings where panels focus on sharing diversity strategies, and that notes have been published through the program office to include solicitation language, which include suggestions such as including someone on their advisory board from their institution's diversity office so that affiliated institutions (usually within their region) could provide them with guidance and strategies. Staff also offered related outcomes that should be considered including: a) the number of students in the internship program who obtained jobs; b) the diversity of the institutions involved in a Consortium; c) the level of involvement from affiliates (i.e. partnerships in more than just name, a qualitative measure); d) the number of community colleges involved; and e) the minority-serving institutions involved.

Evaluation Question 3. One staff member stated it was unclear whether this question was referring to: a) the solicitation and proposal review process at the headquarters level as it relates to base awards, multi-year renewal, annual renewals, and additional opportunities, or b) identifying successful processes or approaches that a consortium would use as they look at competitively awarded funds. Another staff member commented that, "It is important to have questions at the national *and* the consortium levels, looking at the intake for proposals and then looking at the consortium level – assuming this process is different."

Evaluation Question 4. The NASA OE Staff stated that they had not done anything related to effective practices, and that the last five-year evaluation period covered the period of 2003-2007. All data collected from consortia were self-reported, including the self-evaluation that covered whether their practices were effective. In addition, the Annual Performance Document (APD) documents that consortia completed annually included self-reported anecdotal data. For the award, the consortia submitted APDs to the program office, and the APD was compared with proposals to determine if consortia had reached their goals.

Evaluation Question 5. When asked about Space Grant's major contributions to NASA's education mission, the NASA staff members stated that PART measures switched to Performance Goals and APIs and that PART measures looked at indicators of success and all organizations within NASA had to track PART measures. Staff believes that Space Grant exceeds goals and have "phenomenal graduation numbers." Additional contributions to the education mission include the following direct quotes:

- "Workforce development program."
- "Longitudinal tracking [of students]."
- "Space Grant provides the Agency an opportunity to have a presence in every state as well as the District of Columbia and Puerto Rico, so it's the geographic representation of it. Very often Space Grant will be the only NASA presence in a state, but it is intended to have some visibility. Many times, the Space Grant director will be the person the media reaches out to in a state for this reason. "

Evaluation Question 6. Staff suggested an "improvement practice," where Space Grant would look into the progress of consortia at the mid-year point to provide struggling consortia iterative feedback and a chance to improve their performance prior to the 5- year assessment period. Staff also commented that they would like the opportunity and resources to do more site visits. Related to management, when staff were asked whether there were challenges that may prevent Space Grant from achieving its outcomes, participants indicated that funding constraints were a challenge.

- "Congressional language dictates and we do not know until the language passes what the new language is."
- "This limits how we do business."
- "2011 is when the language was included about limiting money for administrative cost, direct cost, and indirect cost."

Evaluation Question 7. There were no comments or suggestions directly related to this evaluation question. However, when asked to operationalize what was meant by "high quality results", the stakeholders viewed this term differently, with responses including: (a) publications, presentations, conferences, (b) dosage and exposure, (c) student engagement in hands-on activities, and (d) success of students in STEM majors and careers.

NASA OE Staff again mentioned the diverse goals of consortia and their need for context via in person site visits to know which high quality results were relevant to which consortia. "Since each consortium is different and there are 52 of them, it is too much to visit each. [We] hope the evaluation will focus on a strategy to adequately address this."

Related to quantifying "high quality results," the NASA OE Staff also struggled to operationalize "longitudinal tracking of students" across consortia (which was viewed as a necessity to tracking some "high quality results") because it is a challenge to longitudinally track individuals and program impact. One staff member said: "It is hard to document [what] engagement or encounters with Space Grant led [a student] to transitioning in the workforce in a STEM discipline, transitioning into the workforce working for a contractor, working in academia related to NASA, or actually working for NASA."

Of the Consortia interviewed, everyone viewed "high quality results" differently. A summary of each is included below via quotes from the interviews.

- Publications, presentations, conferences – *People that can talk about high quality are the mentors. A lot of impact that Space Grant can have is through funding. We could do more if we had more resources and a lessened burden on reporting. We could do more if we had more staff time and less admin.*
- *The numbers are important. The amount of time students are engaged in activities; the amount of time faculty is engaged; the amount of time faculty is mentoring a student. The time shows an impact as well as the numbers do.*
- *Students achieving their next step. Involvement with mentors. Communications/media. Involving students in meetings and keeping them involved is key. This is the first year where*

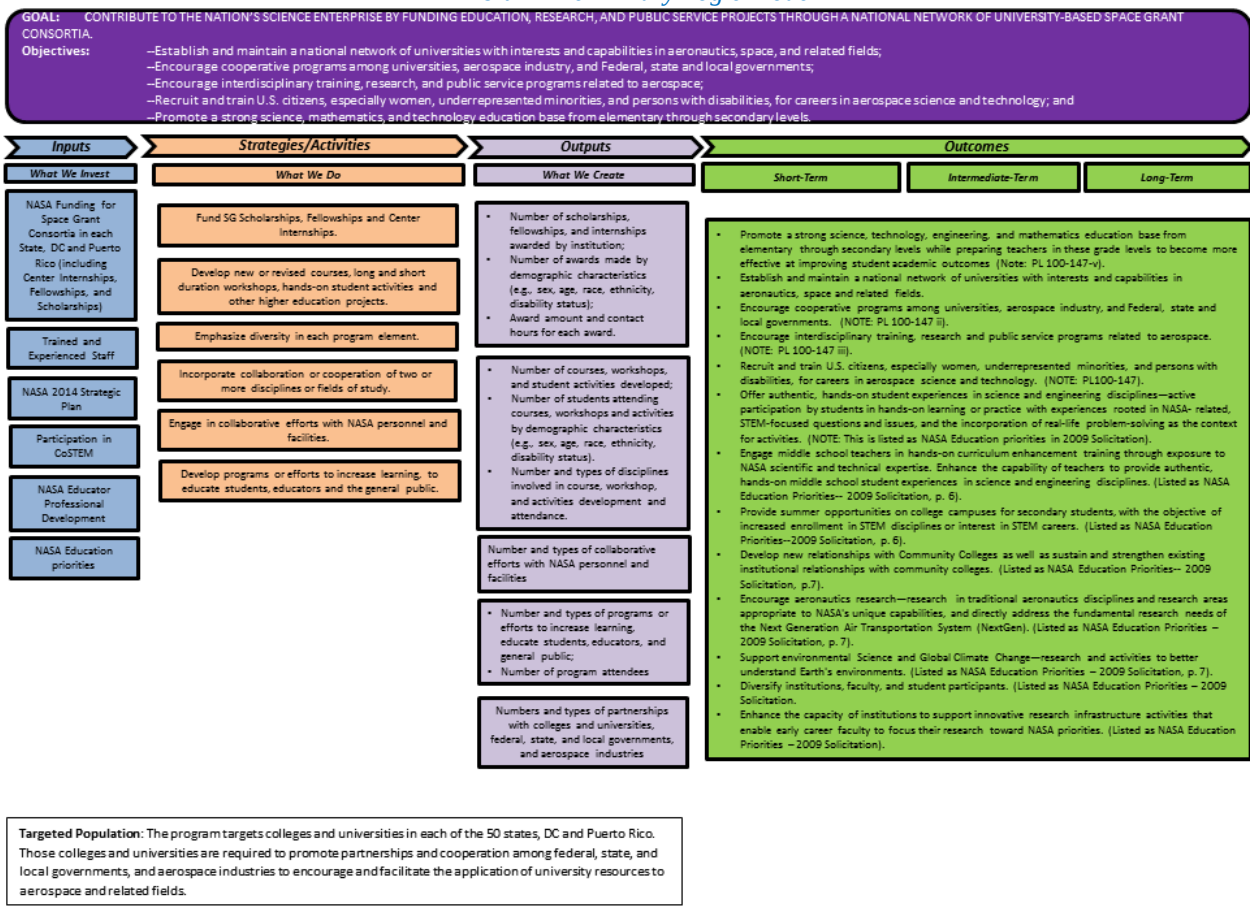
NASA has really said the scholarships need to be hands on experiences and we're excited to see that kind of change. That shows focus on real engagement in meaningful activities. One of the great outcomes that we witnessed is that students who do hands on activities, and really have the experience are usually more productive, usually stay in STEM fields and go on because they become a part of a larger community of like-minded students and faculty.

- *Congress would like to see a lot of big numbers. They want you to play with numbers, jump on an existing fellowship program and add dollars to it. I don't consider that to be a high quality outcome. I think having a program where we control it, we fund it, it is prestigious… that is high quality. It becomes very competitive, that is high quality. We can ensure that the students coming out of the program learn something, learn a lot. It's not just us putting dollars into something so that we can get credit for it. We like to select the project with we would choose for funding in order to get these high quality outcomes.*
- *Success of students in higher education science and technology that go on to work for NASA and places like that. That go on to start their own businesses in the STEM field. Those are high quality successes. Also, if someone competes two years in a row and doesn't place and then wins the next year, etc. That is student success, too.*

Topic 2: Logic Model / Program Model

A preliminary Logic Model was developed based on feedback received during Phase I and the review of relevant SG documents. This preliminary model was discussed as Topic 2. It is important to note that the Logic Model included in this report reflects the 2010-2014 Space Grant program. The text that is included within the Logic Model includes relevant comments and feedback from Phase II interviews that contributed to the development of the Logic Model. Overall, stakeholders agreed to the elements of the Logic Model. However, there were some specific elements with additional caveats, which follow in this section. In the subsections that follow, stakeholder comments refer to the preliminary Logic Model depicted on the following page. As a result, a proposed logic model was created, it is presented in Appendix A as part of the proposed evaluation plan.

Exhibit 4- Preliminary Logic Model



Goal

Stakeholders agreed with the primary goal as written on the Logic Model. NASA OE Staff also pointed out that the goals were listed in the solicitation. All staff stated that the Logic Model was satisfactory and gave general praise with one staff member stating, "This Logic Model is nice!"

Objectives

Interviewees agreed that the objectives in the Logic Model fit the objectives of Space Grant program. NASA OE Staff cautioned, however, that objectives vary by consortia and by consortium type (i.e., Designated Consortia, Program Grant Consortia, and Capability Enhancement Consortia), and that the type of consortium drives the focus of the consortium. For example, the Designated Consortia received the most money and were expected to do a comprehensive program of education research and pre-college activities. Program Grant Consortia received less money but were still expected to do a comprehensive program that involved all program areas. Capability Enhancement Consortia were not expected to do any pre-college and that was an election by their choice. The 2010 definition states that Capability Enhancement Consortia should minimize pre-college and informal education investment. Staff members provided the following breakdown of consortia: 35 are Designate, 8 are Program Grant, and 7 are Capability Enhancement. If a

consortium had a strategy where they had overly invested in one of these areas or they made a decision that they were not going to invest in one of them, they had to provide a strong rationale and in some cases they were successful in doing that and the balance of their program may look distorted from an evaluation and dollars perspective. Some programs were required to reduce the investment in K-12 and Informal Education by submitting new proposals.

One staff member stated, "All consortia have the freedom to operationalize goals differently… consortia have the flexibility to emphasize some objectives more than others." One exception that was frequently noted was the requirement for consortia to have fellowships, internships and scholarships. Additionally, designated and Program Grant Consortia "have to have a balanced program of education research and informal activities" but staff also mentioned that "balanced does not mean equal." It was also noted that there were shifts in priorities during this time period. For example, the Summer of Innovation program led to more consortia focusing on middle schools for designated and Program Grant Consortia, while Capability Enhancement Consortia never had to focus on K-12.

One NASA OE Staff said "If looking at 52 Consortia, then each would have a different Logic Model. If looking at the program, then one Logic Model that has different components that may or may not be relevant for all 52 would satisfy."

Inputs

When asked about inputs, NASA OE Staff agreed that there are five categories of interest laid out in the proposal/solicitation:

- NASA internships, scholarships, and fellowships
- Higher education
- Research infrastructure
- Pre-college (includes students and pre-service/ in-service teachers in K-12)
- Informal education

The 2010 solicitation indicated that these were the five areas that proposals had to be structured around. One staff member suggested adding EPSCoR as an input "because it would help inform the direction of the strategy that a consortium would take" as only some (28) consortia are in the EPSCoR program as well.

Strategies/Activities

Space Grant offered potential additions to the strategies/activities that were embedded in the Logic Model. One consortium recommended adding "**collaboration with non-profit groups and community organizations**" and "**collaboration with museums**" to the types of programs currently in the Logic Model. Another consortium director mentioned adding "**minority serving institutions to include Indian Nation members**." Another consortium director mentioned a heavy "**focus on research**, especially research with topics connected with a NASA center" and believed that should be reflected in strategies and activities along with the inclusion of "**research infrastructure**." Finally, one consortium director suggested adding strategies that "emphasize

excellence, and recognize that NASA curriculum elevates the level of discussion, inspiring students…there's also more at stake for the students, faculty, institutions, the state [because] NASA activities are of a higher quality and standard… strategies should promote excellence and acknowledge exceptional performance." This member suggested that qualitative and quantitative **measures that track impact** should be highlighted. All stakeholders agreed that qualitative measures were absent from the Logic Model and OEPM.

All five Consortia believed that the strategies listed in the Logic Model did reflect their approach for the most part. Most Consortia offered clarifications or caveats to the Logic Model presented which are listed below:

- While all five Consortia believed that the strategies listed were very important, they also agreed that not all Consortia do all of these strategies. For example, not all Consortia are EPSCoR programs. This suggests that a Logic Model "should have different branches" given the nature of the 52 Consortia.
- One participant believed there should be "**weighting of each of the categories**" and the addition of minority serving institutions (to highlight the inclusion of Tribal Colleges);
- One consortium stated, "I think everything is listed, but we could do a lot more in each of these, like give more scholarships, give more fellowships, if we had use of our entire budget."
- One consortium stated that their consortium is not doing much related to "**limiting administrative costs**" though they "make every effort to put as much funding towards the programmatic elements of Space Grant for student and faculty competitions".
- One Consortium was adamant about keeping **administrative costs** down, but mentioned not being able to do anything with the 40% overhead that was kept by their university for administrative costs. This Consortium also mentioned their strength in the "tribal colleges and scholarships and fellowships." In addition, their state matches funded money and their Consortium supports a number of their Space Grant initiatives with that matched money, which makes up for the large overhead that is taken by their university.
- One participant stated that they do not do a lot with "**engage in collaborative efforts with NASA**" because those activities are addressed via EPSCoR. They also stated not working much with community colleges because affiliates do that. Efforts for campus summer opportunities and pre-college programs are also a lower emphasis for them. In addition, one director mentioned that not all Consortia can participate in **on-campus activities or summer opportunities** and because of that maybe strategies should be more generic.
- Two Consortia were confused by the "**create Consortia**" strategy. First, the "create Consortia" strategy was also looked at as being a headquarters level strategy, though one director did acknowledge that re-wording that strategy to be more about "network building within the state" would be relevant at the Consortium-level. Second, it was suggested that "create Consortia" be changed to something focused on increased engagement to clarify the goal of the strategy. "Intrastate Consortia activities" was also suggested as a "sensible and laudable goal."

When asked about the distinct strategies and activities at the national level, Space Grant staff mentioned "partnering with other mission [directorates] in terms of strategy" and pointed to the Space Grant history chart that could explain the historical changes that have occurred to Space

Grant and NASA during this time frame. Additionally, the staff discussed "interactions with mission [directorates] and the centers as it relates to EQ5" as being distinct strategies/activities at the national level.

NASA OE Staff also agreed that the list of strategies and activities in the Logic Model were appropriate. However, they also offered potential additions which are included below with context, when possible.

- Include **research infrastructure** – "EPSCoR and non-EPSCoR Consortia very well have research infrastructure activities."
- Include a **caveat related to EPSCoR** (EPSCoR is only relevant in 28 states.)– "Some Consortia are EPSCoR and Space Grant and they do try to make sure there are some synergies among the two. For the Consortia that are also EPSCoR, Space Grant does not want overlap."
- Add the word "**informal**" – i.e., "informal education strategies, activities." It is possible that this alteration is already included in the Logic Model under "develop programs or efforts to increase student in the public."
- Include **engagement of affiliates**, and
- Include **market penetration**

Finally, there were a couple suggestions related to the flow of the Logic Model as it pertains to strategies. One consortium stated wanting a "strategic arc between where they are now and what the objective is meant to do." For them, the strategies read more like tasks. They wanted the "big-picture strategy from the OE and how that maps onto what they are trying to do." One director suggested following a Logic Model that took Consortia from "participation to the cost end, rules of the road, the strategic plan, and the solicitation leading into goals, then objectives, then applies tactics."

Outcomes, outputs, and measures

According to NASA OE Staff, consortia make their own decisions about what to emphasize in every category except for fellowships and scholarships, and there is a minimum amount of funding that must be applied to that component. Consortia directors agreed; not all strategies apply to all consortia; consequently, the outcomes may vary by consortia. Some additional outputs noted by consortia included: number of students taking part in group hands-on projects; senior design courses and competitions; students in interdisciplinary group projects; design and engineering competitions; number of students involved in research projects; and longitudinal tracking of students who continue further into academia or a STEM career. One consortium director questioned, "How many students have been really involved in research projects and how many students supported by research grants continue on in academia or research? How many students go to grad school? How many get an industry job?"

Some clarifying comments for understanding the context of outputs and outcomes offered by consortia are included below:

-

- There are small states and big states. We have different challenges. We cannot reach all the students we want. We have more than 300 academic institutions and only 20 or so are members of Space Grant. Dozens want to become members. We cannot afford to have more affiliates. The outcomes in many respects are different for the large states. Large states probably have to aim for a broader kind of impact [rather] than a localized student by student impact that small states can succeed at.
- I always worry about the emphasis on numbers. It's also about the depth and the impact on people. That's always hard to measure as an output. I think NASA acknowledges that this is important because they ask for anecdotal stories. The numbers associated with whatever it is that you're talking about could be fairly small, but the impact can be deep and lasting and huge.
- They're very lofty outputs and outcomes, but they're accurate.
- It's important for there to be outcomes and outputs but you have to explain the story of your Consortium for any of it to make sense.
- 'Significant investment' is tricky.
- We have a NASA center; we focus a lot on research projects. The outputs that I see, I don't see anything where I can tell the story of that. What is the result of the STEM funding?
- Number of publications, etc. This is more for the faculty. There's not a lot of publication or technologies coming out of Space Grant. We need to focus on STEM education and promoting STEM education.
- We are a tier two Consortium. I think there are about 13. When you look at the data, we have to keep in mind that we are a Consortium that receives less funding.
- Some states are right beside huge NASA centers. They send people to NASA for summer internships and it costs them much less. There is nothing nearby for us. This puts us at a slight disadvantage compared to those that are really close to NASA centers.

Some suggestions for changes were:

- Get Congress to increase Space Grant budget or have the budget be proportional to something like the number of academic institutions per state.

A variety of measures related to outputs were suggested by the five consortia directors that participated in the interviews. A bulleted list is included below:

- Normalizing performance on the basis of numbers of students or numbers of institutions in the state. "Don't compare state to state."
- Outputs "read like performance metrics. They're all numbers. What we create is not a number of things. We create the things themselves. Measures need to get at that."
- Strength of the outcome – "how good, how excellent, is the outcome?"
- Need qualitative measures to "really show success and impact."
- Outcomes and outputs should be weighted.
- Excellence of the science is not measured in any way.
- "Interview the NASA centers who host the students. Did the students achieve new things? Were they useful? Were they exceptional? Did they have an impact on the work?"

- Establishing relationships between research activities at universities, etc. and the education activities – "Some institutions, and some Consortia, one of their strengths is being able to conduct basic and applied research that actually also has an impact on STEM at all levels. I think making that connection is a very important role for Space Grant."
- Program improvement measures and program effectiveness measures
- Student retention measures

One Consortium also commented on the difficulty associated with outreach and inclusivity of a diverse student population. While they have tried many things, they cannot control for economic issues. They stated:

> *It's a challenge to be as inclusive as we would like to be with the demographics and the diverse student population, as far as our participants go. Unfortunately, it's those students who are the marginal students who are really, maybe, first generation or minority students, are often in that category of lower socioeconomic students who then drop out of college and go get a job to help support their family. That's one of the things we would like more guidance and assistance with.*

When asked about the outputs listed on the Logic Model, three suggestions were given by NASA OE Staff. These suggestions are bulleted below with context, when possible:

- **Number or types of disciplines involved** – This output "would not rise to the priority level of some of the others." Therefore, it does not need to be deleted but it should be noted that it would not be a high priority for Consortia.
- **Age** is not something that is asked for. This output can be deleted because it is not pulled from the OEPM database. Birthdays might be asked for, but those are not used to generate student ages.
- **Number of affiliates** – Multiple staff members agreed that this "needs to be an output."

When asked about the outcome measures that should be considered in an evaluation of the 2010-2014 Space Grant program, NASA OE Staff suggested the following outcomes which have been grouped into short-, intermediate-, and long-term outcomes:

Short—term Outcomes

- Total number of students receiving financial aid as it relates to fellowships, internships, and scholarships.
- Total number of awards by gender, race, ethnicity.
- Profile of institutions that are part of the network (minority serving, Carnegie classification, state/local/federal partner).
- Profile of affiliates.

Intermediate-term Outcomes

- Total number of STEM graduates.
- Qualitative measure of STEM engagement (e.g., case studies to determine student engagement with STEM programming).

- Number of informal institutions ["…ways to characterize the network that would be by number and type of institution beyond college/university/etc."].
  Qualitative analysis of individual institution's participation within the network of their state.

Long-term Outcomes

- Total number of STEM graduates that pursue employment with NASA or other aerospace related industries.
- Total number of students employed in STEM fields.
- Meaningful relationships with affiliates ["So, establish and maintain may be more of the output and the course cooperative programs may be more of the outcome."].

See the proposed logic model in Appendix A for changes made regarding the sorting of outcomes into short-, intermediate, and long-term. Regarding long-term outcomes, staff stated, "The first 6 [listed in the Logic Model] are still appropriate for long-term outcomes and APIs also."

NASA OE Staff noted that, "emphasis would be on outcome one, which would be NASA internship, fellowship and scholarships; higher education; and research infrastructure." According to them, the Consortia made their own decisions about what to emphasize in every category except for fellowships and scholarships, and there is a minimum amount of funding that must be applied to that component. It was also noted that any Logic Model outcomes should also be in the Agency Performance Indicators (APIs) or performance goals.

Finally, stakeholders agreed on the following three factors related to outcomes:

- Quality measures are missing from the Logic Model,
- Not all strategies apply to all Consortia; consequently, the outcomes may vary by Consortia
- Having a NASA center makes difference in activities, and consequently outcomes.

NASA OE Staff added the following points:

- At the time, the Agency didn't have really good quality measures that were put forth. Most was output.
- All strategies do not apply to all Consortia. Outcomes would definitely vary by Consortia.
- Having a NASA center makes a difference in activities and consequently outcomes for the Consortia. Some centers have good relationships with their Space Grant Consortia and the Consortia can leverage off of that. Whether Consortia can effectively leverage is very much personality driven.

Topic 3: Cost Sharing, Leveraged Investments, and Partnerships

In this section, feedback focused on the topics of cost sharing and leveraged investments largely came from one Space Grant Consortia Director, though some feedback is included from an additional consortium interviewee. In addition, feedback on the topic of partnerships was offered by multiple stakeholders and is also summarized below.

Of note, Paragon TEC was informed that the feedback reported here related to cost sharing and leveraged investments would vary by consortia. The opinions below are from one participant's approach. The participant began with stating, "While we all deal with certifying the required match, I think [my consortium] may be somewhat unique in our more entrepreneurial approach to Space Grant funding, our desire to grow our program through additional match or external funding, and our ability to take such an approach."

Participants indicated that NASA Space Grant "requires a matching funds component to each core Space Grant Award for all funding not specifically allocated to scholarships and fellowships". One participant said that "Since we cost share all dollars at least one to one (except fellowships), there is substantial leveraging. This cost sharing is provided by affiliate members and by local or state governments in some cases to substantially expand the impact of NASA dollars."

Another participant further clarified that this matching equals 74% for both designated and program awards, and that "All Space Grants must plan for/attract and certify through reporting processes that at least the 74% level of matching funding is met." This participant indicated that the matching requirement is detailed in the last five-year RFP in "Section E: Funding and Cost-Sharing (Matching)".

One participant mentioned that some Space Grant consortia report more than the required matching funding:

> *NASA HQ would have details on this, but past data I have seen showed more than a 1:1 reported match. Assuming that the national average is closer to 1:1, this means that about half of all funding to Space Grant is from match dollars. My point […] is that Space Grant is a public/private partnership between NASA and the consortia in each of the states and that a substantial portion of funds are provided outside of NASA resources. Since Consortia are seen as the nexus between NASA and the states, what work is done with the non-NASA funding and how those non-Space Grant funds contribute to the work of Space Grant is dictated by those sources as well. This full partnership needs to be understood as elemental to the Space Grant program and its success. Space Grants have requirements to meet the needs of other sponsors as well, though all of it contributes to the overall Space Grant mission. I think it is good for NASA to recognize the value of those matching dollars to NASA. It is certainly a plus for the Agency in its evaluation that it has created such an impactful, highly matched, public/private partnership network in every state across the nation.*

This participant also mentioned that matching funds beyond those required may not be reported, noting that:

> *Higher education institutions generally do not want to report any more than the required match because of tracking requirements and potential negative impact on negotiated indirect costs rates for the institution.*

Another participant stated that their consortium takes on a more "entrepreneurial approach", and seek external funding through partnerships, grants, contracts and building funding in the State budget. The participant stated "[We have] a flexible fiscal structure for pursuing external funding. We are not embedded within a university. [The] University is our host institution, but we use [them] as our fiscal agent. The Foundation has excellent fiscal support and an agile process for supporting development activities and external funding. We report allowable match to NASA and also internally maintain an internal tracking of all *contributed* or *leveraged* funds (including those from federal grants)." This same participant believed that other consortia obtained their match in similar ways.

Exhibit 5 - One Stakeholder's Perspective on Matching Funds

For 2014 we are projecting an actual match amount of [redacted] that could be reported for each core Space Grant dollar. NASA Space Grant funding is projected as being leveraged [redacted] by cash and in-kind funding from all sources. This includes [redacted] from cash funding and [redacted] from in kind contributions from all sources. Our internal report is in the process of being finalized, but these are our best current projections. Our matching funding for 2014 comes from direct Consortium funding of salaries, wages and fringe, equipment, and cash contributions to programs, affiliate contributions for joint projects, state funding for scholarships and fellowships, state funding of precollege programs as well as an industry internship program, and funding for other State STEM projects. Also included in cash contributions are support costs for meals from the [name of event redacted for anonymity] registrations, Industry match to fellowships, and two state-supported Math Science Partnership awards for teacher professional development.

Other federal funding NOT included as matching dollars but leveraged funding to [us] beyond the NASA core grant came from NASA's funding share for the [redacted] program, Space Grant Competitive awards for preservice teacher training and community college programs, NASA award for support of ESTEEM [NASA's climate change education program], NSF Advanced Technology Education grant, FAA award to conduct a national design competition, National Academies' Airport Cooperative Research Program for national design competition and managing a graduate research awards project, U.S. Department of Education Teacher in Residence grant, National Institute of Aerospace Research Student Scholars Program, and NASA grant sub-award from [redacted], STEMTASTIC Teacher Professional Development Program, and other Space Grant sponsorships of [redacted] internships.

In-kind funding matching includes contributions of Board of Director's time and Advisory Council Member's time, affiliate match for fellowships, affiliate contributions for joint projects, state funding for scholarships and fellows, state funding of precollege programs, [redacted] Industry Internship Program, and funding for other State STEM projects. There were also some in-kind federal contributions NOT included as match for mentor time for projects and federal contributions to state-funded fellowships and other contributions for materials expenditures for NASA STEM research experiences. An in-kind facility contribution is also included in our other federal leveraging.

In addition to cost-sharing, participants mentioned that collaboration was also key to leveraging funds. One participant indicated:

> *Our networks are used to communicate activities by entities throughout the state and nationally […], and [we] identify and utilize effective partners to support each new effort." And another participant stated, "The expanded ability to provide scholarships, fellowships, internships, student flight programs, professional development for faculty, new investigator awards and many other kinds of STEM programs in line with our Space Grant mission has been highly impactful and very worthwhile [in terms of building external support]*.

Translating leveraged investments into metrics and data elements

One participant noted that the information on number of students impacted and dollars expended can be collected during annual performance data calls. Another participant noted that the key metric is whether Consortia meet their match requirements. The participant added "It would be good to also recognize the additional value that required match and match beyond the requirement bring to NASA and the Space Grant program – value added […], highlighting the value of NASA's return on investment with Space Grant is a positive for NASA in meeting its mission." The participant went on to say that:

> *We do everything we do under the [our] Space Grant Consortium umbrella including externally funded projects, but per NASA HQ guidance, only report in OEPM what is done with Space Grant dollars, state funding provided to [us] and other direct matching funds to those sources. We internally track contributed funding from all sources because all of this leverages our Space Grant program. NASA doesn't know much about some of our programs because as externally funded programs, they are only reported once as 'grants won'.*

Challenges with leveraging investments and cost-sharing

One participant noted that uncertainty in funding levels poses a key challenge. The participant stated "When there is uncertainty in the level of NASA funding from one year to the next, this poses substantial problems in maintaining cost sharing agreements and partnerships. When funding cuts are proposed (like in the 3-year bridge award), this causes partners to be lost when they are told that their programs will need to be eliminated. Those partnerships are difficult to rebuild." Another participant noted that the current matching requirements are challenging, stating "I hope that NASA will not ask for any more than the current required cost share, which is already challenging for many Space Grants." This participant went on to say:

> *It is a great deal of work to form meaningful partnerships, write proposals, secure state funding, sustain quality partnerships, and generally leverage resources. The cuts to core Space Grant funding have severely reduced funding for staffing and staff time is necessary to undertake building partnerships and securing funding. (Our Space Grant currently pays for less than 2 FTE's in staffing.) It is very challenging, I believe, for Space Grants with relatively small staffs to handle all the demands of running effective Space Grant programs and handling the administrative and reporting side. Having time to expand external funding sources would be extremely difficult without additional staff to provide support and having the right kind of staff support. [We have] been fortunate that, over time, we have been able to build a strong level of funding (about $1.5 million) in the state budget, but that took huge amounts of work, finding legislative champions, and making sure legislators were aware of our programs. We have also been fortunate in securing grants and external funding, but creating those opportunities has been extremely demanding. To write proposals requires certain skills (which may or may not exist in current staffing) and/or strong institutional support for undertaking proposal development.*

Another challenge mentioned was related to building external sources of support (partnerships) to grow the Space Grant program. One participant stated "there is *constant* pressure to sustain those levels of support and to grow new opportunities while maintaining high quality programs that attract additional support. […] getting industry well engaged with [us] and building our state support from the initial $50K line item in the first grant took many years of relationship building. It was certainly not easily achieved."

Partnerships, collaborations, and national strategies

When focusing on partnerships and collaborations, one NASA OE Staff stated that there was cooperation on many levels, including between colleges, universities, community colleges, and informal institutions. The interviewee mentioned that there were "strong partnerships" that would be "best assessed through a qualitative component."

NASA OE Staff said that there is an "expectation that consortia will engage in cooperative programs." One staff member stated that they "involve the NASA centers in annual meetings to hear about what Space Grant is doing, how centers and Consortia could more effectively work together, and how they could exchange resources and opportunities." Another interviewee mentioned "piloting OSSI" or One Stop Shopping Initiative sites last year with a subgroup where they discussed "how they could help facilitate NASA internships and placement." The interviewee said they were "looking into implementing this with the larger group, but it's a work in progress." They were looking at "how they could provide the community with ways to communicate concerns to NASA and to have NASA communicate with the community in order to make sure they get the maximum number of students placed at the NASA centers." Other members expressed that engagement in cooperative programs would differ by Consortium.

- Of course, as you can imagine, some of the consortia that are closely related or logistically close to NASA centers have more involvement versus others. There have been direct attempts from some of the NASA centers to really be more proactive in reaching out to all of Space Grant Consortia.
-
- I think it's really going to be dependent on the consortium.

When asked about strategies to help establish and maintain a national network at the program level, one NASA OE Staff suggested utilizing the consortium concept to focus on getting state networks cohesive (i.e.., first 5-10 years of Space Grant) and then as networks matured, giving them the opportunity to look outside of their individual states and partner across states to work on a national partnership (i.e., emergence of activities that leverage the entire network after Year 10). One member said that the network as a whole was leveraged due to a presence of Space Grant in every state and that it was the intention [of Space Grant] to tap into the national network.

Program level strategies to promote Consortia/affiliate partnerships

NASA OE Staff members stated that the program level strategy to promote partnership was to maintain the national network and encourage cooperative programs. One member stated:

- *Early on, there was a goal to get as many affiliates as possible. This resulted in affiliating in name only. The affiliates were not effectively engaged or qualitatively contributing. A change occurred and Space Grant management focused more on the quality of the interaction. Guidelines were instituted about adding and dropping affiliates. Consortia had to document the process and measure whether the affiliates were doing their part/role in the consortium.*

Pre-college programs and national strategies

Space Grant Education staff were asked what strategies Space Grant management uses and had used at the program level for advising consortia on establishing pre-college programs. Below is their only response.

- Being able to leverage and build off of successful programs that already exist and not necessarily setting up a specific kind of K-12 program themselves. For a period of time, Consortia were dramatically told to stand down from any direct student contact. For a while, pre-college/K-12 programs were supposed to be teacher-focused. These strategies were communicated via solicitations.

DATA QUALITY ASSESSMENT

The objective of the data quality assessment (DQA) was "to determine if and to what extent the data and documentation are of the type, quantity, and quality needed to address the assessment questions." To achieve this objective, the evaluation team conducted an in-depth DQA across the two phases detailed in previous sections. This DQA can help refine the NASA-proposed seven evaluation questions and to formulate recommendations for improvement of performance measurement of Space Grant program.

PHASE I DQA PROCEDURES

During Phase I, the focus of DQA was to determine the consistency of data elements collected by NASA between FY 2010 and FY 2013 to determine if the data reported by the consortia were viable for an evaluation of the Space Grant program that covers the entire Space Grant program cycle that spanned 2010-2014. Since the FY 2010 data collection included the fewest number of data elements, the review of the consistency of data across consortia focused on FY 2010 data. To examine consistency of data collected across years, the Paragon TEC team determined if data collected for FY 2010 performance were also collected for FY2011, 2012, and 2013 reporting purposes. Below are the specific steps that were undertaken:

1) Based on the interviews with NASA OE staff, the team identified instruments used by NASA OE and data reported by consortia.
2) The team listed data elements that may be used for answering the evaluation questions (in Appendix C) based on the review of the following data collection instruments used by

NASA OE: the Survey Monkey questionnaire, Annual Performance Data Report (APD Report), Expenditure Summary and Student Data Tables.

3) The team conducted interviews with NASA OE staff to identify data definitions and guidance provided to consortia on what to report for the data reporting using Survey Monkey.
4) The team reviewed data output of Survey Monkey for FY 2010 performance collection to assess if the consortia used the same data definitions for reporting performance. The review was conducted on the data reported by nine consortia that represented a variety of data collection and reporting capacity.
5) The team reviewed questions posed in the Survey Money for FY 2010 and 2011, and question items listed in OEPM training slides to identify if the same questions were asked by the Survey Monkey and OEPM system.
6) The team reviewed selected Annual Performance Data Reports to check if consortia reported the same data elements over the years.

PHASE II DQA PROCEDURES

The main finding from Phase I was that the data collected by consortia could be rarely used to answer the 7 assessment (aligned to the 13 outcomes) questions because the consortia did not report data by using the same definitions. The data were not reported consistently between FY 2010 to FY 2013, except for the following data:

- Affiliate name and types
- Number of student direct participants
- Number of students who received fellowship/scholarship and significant investment
- Number of students who received fellowship/scholarship and significant investment and advanced in STEM pipeline and employed in STEM industry.

The major reason of inconsistency was that the unit of data differed between Survey Monkey and OEPM. While Survey Monkey collected aggregated information by program components, such as a total number of Research Infrastructure projects or number of authors who published as a result of Fellowship/Scholarship, Research Infrastructure, and Higher Education, the OEPM system collected information about project activity and some data were linked to each project activity. For example, the OEPM system collects the names of affiliates that participated in a project activity. In addition, our review of open-ended questions suggest that the consortia did not report data by using the same data definitions, and they did not report the same data across the years which made comparison challenging.

Given the above findings, NASA OE added the possibility of conducting an external evaluation that covers only a part of the program cycle. Since the OEPM system collects a smaller unit of data (i.e., at the project activity level) and keeps information about individual awardees, one possibility is to evaluate Space Grant program performance for FY 2012 and FY 2013 by using data collected by the OEPM system, if the consortia had collected the data in a similar fashion. Thus, Paragon TEC reviewed the OEPM system more closely to determine if the data in the OEPM system could be used for the evaluation by collecting information on how consortia had collected

and validated data they reported to the OEPM system. NASA OE staff raised a concern of data quality because all data reported for the OEPM system is self- reported. Below are the specific steps undertaken:

1) Interviews with NASA OE staff to confirm the accuracy of OEPM training slides in terms of if these slides were the guide for consortia to enter data in the OEPM system, to learn data structure of the OEPM system and data output possibilities that might be needed for external evaluation. Our interview and follow up questions focused on what data elements were linked, if the OEPM system could generate direct participants by each project activity.
2) Review of OEPM output reports to confirm data structure the team could gather based on the interviews with NASA OE staff and documents.
3) In consultation with the NASA OE staff, identified five consortia directors for interview. Interview protocols and preliminary logic model were sent prior to the interviews.
4) Conducted interviews with five consortia directors. The interviews focused on how they collected and validated data that had been reported to the OEPM system, if they used a standard form, and challenges and improvement recommendations for data collection.

Based on the team's understanding of the data definitions used and the data structure of the OEPM system, and also based on the team's findings from the interviews on how the Consortia collected and validated data, the team presents an assessment of the data quality in the OEPM system below.

DQA FINDINGS

In this section, first, the team presents findings on the performance monitoring system of Space Grant during FY 2010-2014 grant cycle, by focusing on how NASA OE's data collection has changed from FY2010 to FY 2013 performance data, factors that shaped the changes, current data collection instruments. Second, the team presents findings of the DQA conducted in both phases, based on our review of data collected by Survey Monkey and OEPM data outputs and interviews with NASA OE staff and consortia directors. Thirdly, the team presents recommendations about what future evaluators should consider if they plan to use the data in the OEPM system and recommendations for improving the performance monitoring system based on our review of current data collection and recommendations presented by consortia and other stakeholders during interviews and consultation.

Space Grant's data collection and reporting are complex. Interviews and the review of documents suggest that this complexity derived from a variety of factors, including:

- the way Space Grant Program was developed,
- the change in NASA's agency-level performance goals and objectives, and
- the change of data collection systems during the FY 2010-2014 grant cycles.

All of these factors that are both internal and external to the Space Grant program resulted in an epidemic of inconsistencies in the data collected between FY 2010-2014 grant cycle. Consequently, only a small number of data might be used for the external evaluation that cover the entire grant cycle by using all consortia data. In this section, the team highlights these internal

and external factors to provide a background of NASA OE's data collection of Space Grant program.

Space Grant Data Collection Instruments

During FY 2010-2014, NASA OE collected program performance data by using the following data collection instruments.:

Annual Performance Data (APD) Report

An annual report for consortia to report goals, accomplishments, contributions to PART measures (until FY 2012) and NASA priorities, and improvements made. Consortia provided the information in a narrative form. Consortia submitted APD report 60 days before the grant anniversary date, which varied by Consortia. The NASA OE reviewed the report and provided guidance to improve program performance of each consortium. NASA OE did not create a program-wide annual performance report based on the Annual Performance Data Report. The types of data collected slightly changed to reflect the end of the PART measures.

Student Data Tables

Consortia reported the number of student participants by demographics and the number of students receiving significant investment[8] from NASA by the following three program elements: Fellowship/Scholarship, Research Infrastructure, and Higher Education The definition of "significant investment" varied among documents and data collection instruments provided by NASA OE.

According to NASA OE's document associated with Performance Data Request, significant investment is defined as follows: "a monetary ward, internship, or experience which includes one or more of the following characteristics: Has a value of > = $5,000, Participation of >= 160, Through a cost benefit analysis proves to have significant impact on student's academic achievement and employment." (NASA OE, 2010 solicitation, page 32, FY 2010 Performance Data Call Instructions, slide number 7. The same definition was used for FY 2013 Student Data Table).

However, in the OEPM training document, significant investment is defined as follows: "A significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support, 160 or greater hours of direct contact, or some of other support considered "significant". For some projects the minimum level determining significant investment may be greater" (OEPM Slide 90).

[8] According to NASA Office of Education's document associated with Performance Data Request, significant investment is defined as follows: "a monetary ward, internship or experience which includes one or more of the following characteristics: Has a value of > = $5,000, Participation of >= 160 Through a cost benefit analysis proves to have significant impact on student's academic achievement and employment." (NASA Office of Education, 2010 solicitation, page 32, FY 2010 Performance Data Call Instructions, slide number 7) However, in another document (OEPM training document), significant investment is defined as follows: "A significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support, 160 or greater hours of direct contact, or some of other support considered "significant.". For some projects the minimum level determining significant investment may be greater" (OEPM Slide 90).

The consortia also reported tracking data of students who received a significant investment. Students were tracked to see if they continue with STEM field and employed in STEM field. NASA OE sent an excel file to each consortium, and the due date of submission was the same as the Performance Data Request due date. The types of data collected by Student Data Tables did not change between FY2010 and FY 2014 performance reporting.

Expenditure Report

Consortia reported expenditures by program element. An excel file was sent to each consortium to provide the data. The Expenditure Report was due at the same time as the Performance Data Request. The types of data collected by the Expenditure Report did not change between FY 2010 and FY 2014 performance reporting.

Performance Data Request (Survey Monkey and the OEPM system)

NASA OE staff requested the consortia to provide program performance data. NASA OE used Survey Monkey for FY 2010 and FY 2011performance data reporting. Starting from FY 2012 performance data reporting, Space Grant consortia began to use the OEPM system. NASA OE set the due dates, which varied from year to year. The data collected by the OEPM system changed to reflect the change of NASA agency level performance objectives.

Changes over Time

Internally, Space Grant program is a collection of consortia that are diverse in the program focus and management. As stated in the solicitation (NASA OE, 2009, page 6), each consortium was to plan consortium-level programming based on state needs. In addition, consortia directors and NASA OE staff listed other factors, such as difference in grant category, student demographics, proximity to NASA centers, the way affiliates were involved in project activities and how awards within the consortia were managed, and existence of the Experimental Program to Simulate Competitive Research (EPSCoR) grant, as potentially shaping consortium-level programming. In addition, Space Grant consortia have different program start and end dates because the time period(s) the grant(s) were awarded varied by consortia. During the interviews with consortia, the team heard that the fiscal year for each consortium meant the award period(s), thus, fiscal year varied by consortia. Taken together, all these factors make consortium-level programming unique.

Space Grant had repeatedly responded to the changes of NASA agency level education priorities and performance requirements, the external factors that shaped data collection and reporting requirements for Space Grant program. Agency performance indicators have changed from PART (Performance Assessment Rating Tool) to Performance Goals and Annual Performance Indicators, which changed the types of data collected by Space Grant consortia. In the next section, as we present the data collection instruments the NASA OE used, we discuss how they were affected by the agency level shift in performance objectives. The NASA OE team introduced a new data collection system, the OEPM system, and the Space Grant Program began to use the system starting with the FY 2012 performance data reporting. This change is significant in the following two ways. First, it changed the unit of data collected. While the Survey Monkey collected

aggregated number of project activities and affiliates, the OEPM system allowed documenting project activity level information, such as affiliates participated in each project activity. Second, the shift from Survey Monkey to the OEPM system changed the relationship between project activities and outcomes. While Survey Monkey questions were structured to collect publication, additional funding, and other outcome data as a result of fellowship/scholarship, research infrastructure, and higher education program elements, the data structure of the OEPM system considers these outcomes as the result of research infrastructure and higher education activities. The following table provides an overview of the timeline of the above changes.

Exhibit 6 - Change of data and measures over time

<table>
<tr><th>Performance years</th><th>Annual Performance Data (APD)Report</th><th>Student Table</th><th>Budget Expenditure</th><th>Performance Data Request</th><th>NASA-wide Performance Measures</th></tr>
<tr><td>FY2010</td><td rowspan="5">APD Report</td><td rowspan="5">Excel Spreadsheet</td><td rowspan="5">Excel Spreadsheet</td><td rowspan="2">Survey Monkey</td><td rowspan="2">PART</td></tr>
<tr><td>FY2011</td></tr>
<tr><td>FY2012</td><td rowspan="3">OEPM System</td><td>PART and Annual Performance Indicator (API)</td></tr>
<tr><td>FY2013</td><td rowspan="2">API</td></tr>
<tr><td>FY2014</td></tr>
</table>

Data source: Interview with NASA OE Staff, NASA OE's "Data Call" document

Changes in NASA-wide performance measures

Agency-level change(s) of the strategic plan and the change of NASA OE's outcomes and strategic objectives played a role in NASA OE's data collection from the Space Grant consortia. At the beginning of the FY 2010-2014 grant cycle, Space Grant was to address NASA OE outcomes, which derived from the 2006 NASA Strategic Plan. There were three outcome areas: Outcome 1: Higher Education, Outcome 2: Elementary and Secondary Education, and Outcome 3: Informal Education. Under each outcome area, NASA OE created several objectives, and Consortia were

to align their project activities with these outcome areas when they wrote proposals for FY 2010-2014 grant.

Starting around 2012, NASA OE began to use "four lines of business" to describe its work. The four lines of business are: a) STEM Engagement b) Educator Professional Development, c) Institutional Engagement, and d) NASA Internships, Fellowships, and Scholarships. NASA OE Staff informed this new conceptualization of NASA activities through presentations at annual meetings. The data collection instruments did not reflect the categorization of activities by the four lines of business[9]. The end of PART measurements affected the data collection of Space Grant program. As the table 2 shows, the APD report for FY 2010 performance reporting included a question about program performance that contributed to PART measures. The FY 2011 the APD report did not ask this question.

Exhibit 7 - Change in APD Guidance over time

FY2010 APD report guidance	FY 2011 APD report guidance
PROGRAM CONTRIBUTIONS TO NASA EDUCATION PART MEASURES *Include summary data plus explanation for bulleted list (succinct)* • **Student data and Longitudinal Tracking**: Number of program student participants employed by NASA, aerospace contractors, universities, & other educational institutions; Number of undergraduate students who move on to advanced education in NASA-related disciplines; Number of under-represented and under-served students participating • **Course Development:** Number of new or revised courses targeted at the STEM skills needed by NASA that are developed with NASA support • **Matching Funds:** Ratio of funds leveraged by NASA funding support • **Minority Serving Institution Collaborations:** Summarize interactions	**PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES** *Include summary data plus explanation for bulleted list (succinct)* • **Student Data and Longitudinal Tracking:** Number of program student participants employed by NASA, aerospace contractors, universities, & other educational institutions; Number of undergraduate students who move on to advanced education in NASA-related disciplines; Number of under-represented and under-served students participating (e.g.: Student Data and Longitudinal Tracking: Total awards = 200; Fellowship/Scholarship = 120, Higher Education/Research Infrastructure = 80; 90 of the total awards represents underrepresented minority F/S funding. 10 students have accepted STEM positions in an aerospace industry, while 3 have graduated and are pursuing advanced STEM degrees.) • **Diversity:** of institutions, faculty, and student participants (gender, underrepresented, underserved) • **Minority Serving Institution Collaborations**: Summarize interactions.

It is important to note that while there were 13 PART measures listed in the 2010 solicitation and the consortia were required to report the first four measures. Consortia could choose additional measures their consortia would address. The measures listed in the APD Report are:

- Percentage of NASA higher education program student participants employed by NASA, aerospace contractors, universities, & other educational institutions. (60%)
- Percentage of undergraduate students who moved on to advanced education in NASA-related disciplines (40%)

[9] Staff reports there was an effort within OE to align data to reflect the four lines of business, but the OE staff decided not to require consortia to change reporting format.

- Number of underrepresented and underserved students participating in NASA higher education programs. (8,500)
- Number of new or revised courses targeted at the STEM skills needed by NASA that are developed with NASA support. (60%)
- Ratio of funds leveraged by NASA funding support. (80%)

PART measures listed in 2010 solicitation that were optional to the consortia and not listed in the guidance document were:

- Number of institutions served in designated Experimental Program to Stimulate Competitive Research (EPSCoR) states (200)
- Percentage of elementary and secondary educators who participate in NASA training programs and use NASA resources in their classroom instruction. (>2 days of training) (75%)
- Percentage of elementary and secondary educators who either obtained NASA content-based education resources or participated in short-duration NASA education activities and used NASA resources in their classroom instruction. (60%)
- Percentage of students who expressed an interest in science, technology, engineering, and math (STEM) careers following their involvement in NASA elementary and secondary education programs (> 50%)
- Number of elementary and secondary student who participated in NASA instructional and enrichment activities. (470,000)
- Cost per participant for NASA elementary and secondary education programs. ($12.57)
- Dollar invested per number of page views for NASA OE website. ($0.032/page view)
- Number of museums and science centers across the country that actively engaged the public in major NASA events. (350) (Source: Solicitation page 25-26)

According to the OEPM Training slides, OEPM system included all PART measures, and consortia indicated to which PART measures their program outcomes contributed. In 2014, NASA's agency level performance objectives changed to reflect a new strategic plan (Strategic Plan 2014-2016). NASA OE staff reported that the current OEPM system reflects the new Annual Performance Goals and Indicators. The OEPM system was modified for FY2014 data collection to collect data in support of the new performance goals and indicators.

Change in performance data request from Survey Monkey to OEPM system

The third factor contributing to a small number of data elements being consistently collected over the grant cycle was the change of data collection instruments from Survey Monkey to the OEPM system. This section presents the data structure of Survey Monkey (used for FY 2010-2011 performance data collection) and the OEPM system (used for FY 2012-2013 performance data collection). Understanding the data structure of these two data collection instruments is important because some data elements are linked to specific data elements, which shapes the types of information the future evaluator will be able to collect for the Space Grant program. For example, it is challenging for a future evaluator to get information related to the level of NASA funding for

a specific project activity and how many people participated in the specific project activity. An example could be a balloon launch for FY 2010-2011. The Survey Monkey form did not collect funding levels or the number of participants for each project activity.

The review of data structure of the OEPM system found that Survey Monkey and OEPM are based on different ideas about the relationship between project activity, outputs, and outcomes. As the figure below shows, while questions in Survey Monkey asked consortia to report publications, papers, patent, and technology transfer as the outcomes of Fellowship/Scholarship, Research Infrastructure, or Higher Education project activities, the data structure of OEPM makes these outcomes were results of Research Infrastructure and Higher Education. This means if consortia marked a project activity as Fellowship/Scholarship only and if participants produced papers, they were not captured in OEPM.

Exhibit 8 – Envisioned contribution of program elements to outcomes/outputs

Outputs or outcomes	Survey Monkey	OEPM
Publication/papers	Fellowship/Scholarship, Research Infrastructure, Higher Education	Research Infrastructure Higher Education
Patent	Fellowship/Scholarship, Research Infrastructure, Higher Education	Research Infrastructure Higher Education
Technology transfer	Fellowship/Scholarship, Research Infrastructure, Higher Education	Research Infrastructure Higher Education
Additional funding	Research Infrastructure Higher Education	Research Infrastructure Higher Education
Higher education courses (new and revised)	Higher Education	Higher Education
Online STEM tool	Not included	Research Infrastructure Higher Education Pre College Informal Education

The future external evaluator should be aware of the mismatch between Survey Monkey and the OEPM system, which touches upon the program model. Below, the team describes the data structure for each data collection instrument in detail.

Survey Monkey

Survey Monkey included 56 question items (FY 2010) and 60 question items (FY 2011) that were divided into the following sub topic areas that corresponded to the program elements:

a) Consortium Specific Information (types of Consortia)
b) Fellowship/Scholarship Data (number of projects)
c) Research Infrastructure Data (number and description of projects, number and types of affiliates, description of non-affiliates involved, number of non-student direct participants by gender, number of non-student direct participants who are underrepresented minority and disability status)

d) Higher Education Data (number and description of projects, Name of affiliates and non-affiliates organizations who participated, description of non-affiliates involved, number of non-student direct participants by gender, number of non-student direct participants who are underrepresented minority and disability status, number of new and revised higher education courses, description of collaboration)
e) Summary Data: NASA OE Outcome I (number of authors published, number of manuscript submitted, number of invited papers, self-submitted papers; number of patents applied, granted, and license issued, number of technology transfer, number of proposals submitted, funded, and amount of funds, number of Direct participants in Outcome 1 who are pre-service teachers, number of pre-service teachers received monetary award, among significant awardees number did not receive direct monetary support).
f) Precollege Data (number and description of projects, name of affiliates and non-participated, if activity for middle school educators, students and Summer of Innovation were offered and descriptions of the activities, number of workshops (short, long duration), number of direct participants by type, description of involvement of higher education faculty, evaluation mechanism in place to demonstrate the contribution to STEM pipeline, and teachers utilizing materials)
g) Informal Education Data (number and description of projects, name of affiliates and non-affiliates, number of short and long duration workshops, student activities, exhibit, public at large activities, number of direct participants by type, description of involvement of higher education students and faculty)

In the Survey Monkey form, the relationship between each program element and outcomes were as follows:

- Publication, papers, patents, technology transfer were outcomes of Fellowship/Scholarship, Research Infrastructure, and Higher Education Programs.
- Proposals for additional funding were outcomes of Research Infrastructure and Higher Education Programs.
- Higher Education Courses (both new and revised courses) were the outcomes of Higher Education Programs.

The OEPM System

While Survey Monkey collected aggregated information by program elements as a primary unit, the OEPM system asked the consortia to enter project activity and associated information, such as the number and types of affiliates participated, program elements, and cost information. This meant that while Survey Monkey reported a total number of project activities that are categorized as one of the five elements (i.e., Fellowship/scholarship, Research Infrastructure, Higher Education, Pre College, and Informal Education), the OEPM system generated a report on each project activity, including project activity description, affiliates and non-affiliates participated, and outcomes, such as how many authors published from a particular project activity. The way OEPM collects data is better than Survey Monkey because the OEPM collects information of individual students, rather than aggregated numbers that cannot be traced back. External evaluators will be able to validate some of the data because data can be traced back to individual level information.

The evaluator will be able to confirm which students were counted as under-represented minorities by cross referencing student information saved in the OEPM system.

Our understanding from the OEPM Training Slides and interviews conducted with the NASA Staff is that some of the data can be considered as outcome data, such as the number of proposals, publications, patent, and additional funding are collected for project activities that are marked under the Research Infrastructure, Higher Education, Pre College and Informal Education. In addition, depending on how a project activity's sub element is marked, slightly different information has been collected. This derives from different forms used for different sub elements. Depending on which sub elements a consortium member marks, different forms are provided which require different data.

Below, the team presents their understanding of the data structure of the OEPM system.

- When a consortium enters a project activity name, OEPM asks for sub elements. Consortium has a choice of assigning only one sub-element or assigning multiple sub elements. Sub-elements are: Fellowship/Scholarship, Research Infrastructure, Higher Education, Pre College, and Informal Education.
- If the consortium marks only Fellowship/Scholarship, this activity does not require information in the Core Data Form. If one of the rest of the four-sub elements is marked, the OEPM system requests the consortium to fill out a Core Data Form, which includes questions on program description and outcomes data. The information includes:
    - Name of participating affiliates and non-affiliates
    - Description of activity
    - If the activity is an ongoing activity
    - Competitiveness
    - NASA connections, (i.e., alignment with NASA Mission Directorate and NASA offices)
    - Partnership with NASA Center
    - Matrices used to determine the effectiveness of the project activity
    - Contribution of project activity to meet the goals and objectives of the projects or agreement with NASA OE
    - Number of authors published and publication information
    - Number of papers submitted or involved to present and its information
    - Number of patent applied and issued
    - Number of technology transfer
    - Number and amount of additional funds applied and earned.
- Depending on the sub-elements marked, consortia also enter data by filling out a program activity form for each sub-element. For example, if an activity is marked Research Infrastructure and Pre College, the consortium fills out the Core Data Form (described above), Pre College Form, and Research Infrastructure Form. Questions asked slightly vary among the forms.
- OEPM also requires consortia to create a student award profile for the following types of students:

- Students who received any amount of funding from Fellowship/Scholarship (i.e., activities are marked Fellowship/Scholarship)
- Students who received significant investment from the activities that are marked as Research Infrastructure and Higher Education Programs

NASA OE staff reviews the numbers reported in OEPM by comparing student tables, which reports the aggregated number of students who are direct participants, who received financial awards, and who received significant awards from activities that are marked as Fellowship/Scholarship, Research Infrastructure, and Higher Education. However, our review of the Student Detailed Award Report (OEPM Outputs) found students with less than significant award amounts or its "sub element" marked "Pre College" or "Informal Education." According to NASA OE staff, some consortia might have reported student information for students who did not meet the NASA OE's definition of significant investment. The NASA OE staff did not discourage the consortia from reporting student information, including reporting students who received monetary award for activities marked as Pre-College and Informal Education. In addition, as was described in the findings from the interviews with consortia directors, some consortia used different definitions of significant investment. This information is not required by NASA OE, however, it appears some consortia provided it.

The above mentioned flexibility of reporting information of students who did not meet the significant investment threshold is also reflected in the OEPM training slides, which states "For all students who received direct funding and those who meet the criteria for significant engagement, look up student profile. If no profile exists, create one. Enter new Award data for each student" (slide 52), in Informal Education Form), allowing consortia to enter student information that does not meet the criteria of significant investment.

Quality of data collected by Survey Monkey and OEPM system

This section presents findings on the data quality by focusing on validity and reliability of data collected by consortia. During Phase I, the team found that there was limited consistency among data collected by Survey Monkey and the OEPM system. In addition, consortia reported data by using different definitions, which makes it difficult to conduct an evaluation of Space Grant program. During Phase II, in order to assess the validity and reliability of data reported in the OEPM system, the team conducted interviews with five Space Grant directors and staff members who were responsible for entering data in the OEPM system to ask how they had collected and validated data that were reported to the OEPM system. In this section, the team presents findings from the DQA during the Phase I and Phase II.

The outline of this section is as follows. First, the team presents findings from Phase I, which reviewed the consistency of the data across years by reviewing questions asked in Survey Monkey and OEPM system and which reviewed consistency of data across consortia by reviewing the data reported by consortia in response to Survey Monkey questions. Second, the team presents findings from Phase II, quality of data reported via the OEPM system by focusing on how consortia collected and validated data. Third, the team presents challenges and recommendations on the current performance monitoring system consortia reported.

Findings on the quality of data reported through SurveyMonkey

The review of Survey Monkey questions, guidance on Annual Performance Data Report, Student Data Tables, Expenditure Summary Reports, and OEPM training slides found that only a limited number of data were collected consistently across five-years. Appendix G presents a crosswalk of data collected by Survey Monkey (FY 2010-2011 performance) and the OEPM system (FY 2012-2013 performance) and our assessment of the validity of the data and reliability of reported data across consortia. It is important to note that because Survey Monkey collected aggregated numbers by program element and the OEPM system collected data for each project activity, most of the data elements cannot not used to measure performance of the entire grant period.

Besides the limitations that derive from the change of data collection forms from Survey Monkey to the OEPM system, our review of data reported by 13 consortia on Survey Monkey, Annual Performance Data Report, and Student Data Tables found the following issues that limited the validity of data and reliability of data across consortia.

a) Ambiguous question items in the Survey Monkey allowed consortia to report numbers that could mean different types of performance.
b) The consortia reported the numbers using differing data definitions.
c) Performance on NASA priorities were not reported in a consistent manner, which makes cross-consortia and cross-year comparison difficult.
d) There were possible data entry errors by the consortia.

Below we present examples of the above issues:

a) Ambiguous question items

The following statement in the Survey Monkey questionnaire in FY 2010 at the beginning of series of questions asked for outcome data for NASA OE Outcome 1. "If you did not collect the data requested or if the answer is zero, please enter "0"." This means that "zero" on NASA OE Outcome 1 questions can mean either "the Consortium did not have data" or "the Consortium did not have an outcome." Within the sample of thirteen Consortia, all consortia reported zero for at least some of the outcome questions. Since there was no follow-up question to ask for the names of grant proposals and articles published, it is not possible to determine whether the zero represents no data or no publication or no proposal. This finding draws into question the overall validity and reliability of Space Grant data collected over the years.

b) Differing data definitions

Review of the numbers reported by the consortia and the description of their projects and activities suggest that the consortia reported the numbers based on the data definitions that are not consistent across consortia. When reviewing the number of projects, the team noticed the number varied greatly among consortia. The consortia's responses to open-ended questions describing the nature of the projects indicate that they counted the number of projects based on different definitions of

"projects." Below are presented a few examples of inconsistency for the number of projects and the number of participants.

Number of projects

Survey Monkey questionnaires for FY 2010 and 2011 requested consortia to report the number of projects supported by Space Grant funds under each of the following program elements: Fellowship/Scholarship, Research Infrastructure, Higher Education, Pre-College and Informal Education. NASA OE defined "project" in the section of Fellowship/Scholarship, Research Infrastructure, and Higher Education Programs as follows:

> "Project" is defined as an opportunity or entity that a student would apply for; it is not the number of individual fellowship/scholarship student projects. For example, if you have a statewide Undergraduate Scholarship opportunity to which students apply, this would count as "1" project. (Survey Monkey questionnaire FY 2010, FY 2011, and Fellowship/Scholarship Data).
>
> "Project" is defined as an opportunity or entity to which a student or faculty member would apply; it is not the number of individual student or faculty projects. (Survey Monkey questionnaire FY 2010, FY2011, Research Infrastructure Data section and Higher Education Data section)

In the Pre-College and Informal Education sections, there was no definition of project provided in the Survey Monkey questionnaire FY 2010. The table below presents the variance in the number of projects reported by consortia.

Exhibit 9 - Minimum, maximum, and average of the number of projects reported by 52 consortia

Program elements	Minimum	Maximum	Average
Fellowship Scholarship	1	28	7.4
Research Infrastructure	1	16	5.1
Higher Education	1	56	11.1
Pre-College	1	64	8.7
Informal Education	0	36	5.8
Total	6	115	38

Since the Survey Monkey questionnaire did not include question items to collect standardized information about what each "project" entails, it is difficult to know how each consortium counted the number of projects. The review of the open-ended questions where consortia described the nature of the projects suggests that what one "project" entails was different across the consortia. Below are examples of the different definitions in two project elements, a) Fellowship/Scholarship and b) Pre-College, based on the review of the thirteen consortia data.

Fellowship/Scholarship

Survey Monkey defined project in Fellowship/Scholarship as follows:

The descriptions of the nature of Fellowship/Scholarship projects indicate what entails in one project differ by consortia. For example,

- One consortium reported one project, which includes both scholarships and fellowships.
- Another consortium reported three projects, which includes:
  - Fellowships (provided to graduate students),
  - Scholarships (provided to undergraduate students), and
  - STEM Academic scholarships (provided to students at specific universities).
- Another consortium reported 14 projects, and it reported as follows. It was difficult for us to verify the count of 14 projects, using only the quote below:
  - "Projects include: Graduate and Undergraduate Research Fellowships (Fall and Spring), Summer Research Fellowships for (University Name) State University Undergraduates, "NASA Internships, (Team name), CC Transfer Scholarships, and CC STEM Scholarships run by our seven community college affiliates." (FY2010 Survey Monkey, Q 2-2)

While the number of projects reported in Survey Monkey questionnaire may reflect what each consortium conceptualized as an "opportunity or entity that student would apply for," this variance will be problematic for the data supporting an external evaluation. The data are not comparable across consortia.

Pre-College

There was no definition included in the section of Pre-College and Informal Education. The number of projects reported by the thirteen consortia varied from one to sixty-four. Many of the project descriptions provided in response to a question asked in Survey Monkey did not list all the projects they included, so it was difficult for the Paragon team to know how the consortia counted the number of projects. Based on our review and by reviewing consortia's report on other question items, below is our interpretation.

- One consortium reported the number of pre-college projects as one, which includes at least two different activities that targeted different populations. They are:

  a) (project name) Teacher Training Phase Two, which focuses on pre-service teachers to consider teaching careers in STEM,

  b) (project name) Program Phase One and Phase Two, programs for grade 9 and grade 10 students.
- Another consortium reported the number of Pre-College projects was 64. This number is the sum of the number of teacher professional development (51) and the number of student activities (13), which is reported in the latter part of Survey Monkey questionnaire. Thus, this consortium considered each activity as one project, which may or may not be a part of a program, initiative, or funding program, as one project.

Types of participants

NASA OE collects the number of participants in attendance for Space Grant funded activities. Survey Monkey questionnaire lists the following two types of teachers: a) in-service teachers and b) pre-service teachers. NASA OE staff reported the following definitions about pre-service and in-service teachers.

- Pre-service teachers are college students who are planning to become a teacher, thus they are undergraduate students.
- In-service teachers are teachers who are teaching at school.

According to the above definition by NASA OE staff, in-service teachers are part of students. When reviewed the data with this definition, among the thirteen consortia, one consortium did not define pre-service teacher as college students.

- In Research Infrastructure section, this consortium reported 65 "Other participants male" and 73 "Other participants female" (FY 2010, Survey Monkey Q 6-4)
- In the next question, this consortium described "Other participants are pre- and in-service teachers" (FY 2010, Survey Monkey Q 4-6)
- In the Student Data Table, this consortium reported zero direct participant to Higher Education and Research Infrastructure (Student Table, FY 2010, Student Table A). This means this consortium did not include pre-service teachers as students.

"Faculty" could mean different things to consortia. While NASA OE staff mentioned faculty might include anyone who is employed by a university, some consortia took a narrow definition and excluded research associates, post-docs, and coordinators from faculty and reported as "Other." Since this difference was based on the open-ended response in Survey Monkey, it will be difficult for an external evaluator to tell which consortia included non-instructional or non-tenured university staff as faculty. The above findings mean that **an external evaluator will not be able to compare participants to each program elements by type of participants,** for example, comparing the number of faculty member and non-faculty member, student participants and non-student participants, because consortia reported these numbers by using different definitions.

c) Inconsistent reporting

NASA OE provided a guidance document on what each section of Annual Performance Data Report should include. According to this guidance document, in the section, PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES, Consortia were to report, "NASA OE Priorities: Accomplishments related to the 'Current Areas of Emphasis' stated in the 2010 Space Grant solicitation. Report on areas that apply to work proposed in your proposal and budget" (NASA, File name: FY 2012, XX_FY12XProgress_APD), and the document included the eight priorities. When a Paragon team reviewed the reports submitted by the thirteen consortia (total 52 reports), the team found that all annual reports follow the same format, however, the degree of description varied, and some consortia did not report on the same NASA priority areas across years.

Reporting on NASA priorities began in FY 2011 Annual Performance Data Report, under the section "Program contributions to NASA OE performance measures." The table below presents if the consortium reported on NASA OE priorities of "Authentic, hands-on student experiences in

science and engineering discipline" in their APD Report consistently. Of the 13 consortia, two consortia did not consistently report on this priority over the years. Of the two, one (consortium B) mentioned "hands on activity" in other section. in the Program Goal section from FY 2010 to FY 2012. The team could not figure out if this one consortium intended to address this particular priority and if the information should have been reported under the Program Contributions section. Since there was no guiding question provided to the consortia to fill out the contribution of Space Grant program to NASA OE priorities, the descriptions vary in terms of comprehensiveness of the activity and outcome reporting. The change of reporting by the consortia may derive from the change of programming that reflects the change of NASA agency level education priorities or state needs, as described earlier in the section addressing program model. Taken together, our review of Annual Performance Data report suggests future external evaluators will need to learn the program context to better understand APD report. The lack of data and inconsistencies in reporting will make it difficult to assess consortia's performance on NASA priorities.

Exhibit 10 - Difference of coverage on reporting of NASA Priorities: Hands on Authentic Activity

Consortium	FY 2010	FY2011	FY 2012	FY2013
A	No	Yes	Yes	Yes
B*	No	No*	No*	Yes
C	No	No	No	No
D	No	Yes	Yes	Yes
E	No	Yes	Yes	Yes
F	No	No	No	No
G	No	Yes	Yes	Yes
H	No	Yes	Yes	Yes
I	No	No	Yes	NO REPORT
J	No	Yes	Yes	Yes
K	No	Yes	Yes	Yes
L	No	Yes	Yes	Yes
M	No	Yes	Yes	Yes

Source: APD Report, "Program contributions to NASA OE performance measures" section.
*Note: * Consortia B reported "hands on activity" in a different section in FY 2010-2012*

d. Possible data entry errors

Student Data Table and Expenditure Summary are data collection instruments consistently used from FY 2010 to FY 2013. While reviewing FY 2010 Student Data Tables of the thirteen consortia, the team discovered that two consortia reported inconsistent numbers in the section on the number of students who participated in Fellowship/Scholarship, which is likely to be data entry errors unless these consortia misunderstood the data definition.

Two consortia reported different numbers in Table A1, Fellowship/Scholarship direct participants, and Table B2, Fellowship/Scholarship direct funded students. Since all fellowship/scholarship participants should receive a fellowship or scholarship, the number of students in Fellowship/Scholarship in Table A1 and Table A2 should be the same. The difference in numbers reported in Table A1 and Table A2 was eight in one consortium and 172 in another consortium. NASA OE staff suspects one consortium might have reported the number of students who applied for scholarship rather than who received the scholarship. Since there is no standardized individual student data for FY 2010 and FY 2011, it will be difficult for an external evaluator to figure out how many students actually received scholarships. As we described previously, the OEPM system collects individual student information so the evaluator will be able to cross check the numbers reported in Student Data Tables with the data of individual students.

Findings on the quality of data reported by the OEPM system

During the Phase II the team's effort of DQA focused on finding out how Consortia collected and validated data that they reported to the OEPM system. The way data are collected is better in the OEPM system than Survey Monkey because the OEPM system collected individual level data on student participants who received significant awards and output and outcomes were collected for each project activity. The OEPM data could provide more detailed information about program activities. NASA OE's data staff informed us that they are concerned that all data are self-reported by the Consortia and there is no way to assess the validity and reliability of data they receive in OEPM system, except for identifying inconsistency in number and description between the numbers reported to the OEPM system, Student Table, and Expenditure Report, and abnormal change in numbers between reporting years.

In order to learn how consortia collect and validate data, Paragon TEC interviewed five consortia directors and a staff member who was responsible for entering data in the OEPM system to learn how they collected and validated data. The team focused on questions on selected data elements, such as direct and indirect participants, significant investment, number of publications, patents issued, technology transfer, and additional funding. These elements were selected based on the team's assumption that these were most likely to be used for the external evaluation and consortia would be able to offer an adequate response within the limited interview time (30 min for the OEPM data collection). In the interview, the team also asked about consortia's overall process of data collection, including how they decided which organization should be reported as affiliates and how sub elements were selected for each project activity, since sub-elements determine which outcome data is collected for each project activity.

Appendix G contains the table of a crosswalk of data elements. Our assessment of validity and reliability of data collected by the OEPM system are based on the interviews with the five consortia. We used the data collection and validation process, data definitions used, and potential challenges reported by the five consortia to assess if data reported to the OEPM system are valid or reliable across consortia. We rated data as potentially highly valid if the data were collected comprehensively and if data were cross referenced with other sources, including student award profiles. Some consortia had a better system to collect valid data than others, and in this case, we noted validity varies by consortia. Reliability of data across consortia depends on how consistently

the data were collected among consortia. When consortia reported using a different definition, we rated reliability as low.

How consortia collected and validated data

The five consortia reported different processes for collecting data for input into the OEPM system. All consortia reported that they had collected reports from either affiliates, principal investigators, or student awardees who were funded by Space Grant. While two consortia contacted each awardee (both student awardees and principal investigators), other consortia relied on affiliates to collect information.

- One consortium reported that the lead institution (the Space Grant Director's institution) manages all awards for projects (research infrastructure, higher education, pre-college and informal education project) and scholarship/fellowship projects and also reported that the lead institution collects information about projects, the number of student participants, and student information directly from the awardees.
- Another consortium reported that the lead institution runs all fellowship competitions other than competitively awarded activities. The staff member at the lead institution contacted individual students and sent out data collection forms (which includes information needed for OEPM reporting) to each awardees.
- Another consortium reported that each affiliate runs a scholarship/fellowship competition. This consortium reported that the affiliates sent in scholarship/fellowship applications that were filled out by student applicants. The scholarship/fellowship applications include information needed for completing the award profile section of the OEPM system.
- Another consortium reported having an affiliate representative who was responsible for getting data associated with all activities his/her institution offered to the lead institution. This lead institution also uses forms, but the affiliate representative makes sure that each affiliate reports all data to lead institution.
- One consortium reported that the affiliate collects and reports data to the lead institution. Each affiliate runs its own project, including fellowship/scholarship competition. Thus, rather than the lead institution contacting awardees to collect their profile information, each affiliate collects information and reports to the lead institution.

All consortia reported that they collect data that are required for the OEPM, and four consortia reported using standardized forms. One consortium did not use form reported but sent an e-mail to affiliates. Exhibit 11 (below) presents a list of forms the four consortia used to collect information from affiliates or awardees; it also notes whether each form was sent to an affiliate or an awardee (i.e., students or principal investigators). While some consortia used separate forms to align with the OEPM's project activity forms, other consortia used one form that included information asked in the OEPM's five activity forms and the core form. Samples of these OEPM forms are available in Appendix D. Consortia varied in the timing of data collection and how it approached longitudinal tracking. NASA OE may need to provide a standard template form in order to have reliable data going forwards.

As for student information needed to report for the OEPM's Award Profile, two consortia collected information twice. The first collection occurred when the first payment was made, and the second at the end of scholarship/fellowship period. Both forms included demographic information and other information required by OEPM. The post survey also collected activity information and updates in contact and other information. Both consortia also provided students with a document that explains that their information will be shared with NASA and they will be contacted for longitudinal tracking. While these two directors did not report challenges of collecting student personal information, two consortia reported that higher education institutions vary in their policies of what type of student information can be collected, which presents a challenge for the consortia to collect student information. For example, one consortium director reported that some institutions do not allow the collection of student demographics and other information prior to the decisions of fellowship award. While the consortium collected information after the award decisions were made, it could not deny funds if students did not report their personal information needed for the OEPM system. This suggests that not all consortia could collect complete student data. For longitudinal tracking, the consortia differed on whether and how they collected data on individual students. One Consortium reported keeping a master excel file that includes all students' names and other information (including if the student received significant awards). This consortium sent a list of students who received significant investments during the previous year, and asked each Affiliate to update students' information. Based on this information, the lead institution filled out Student Table B. Several consortia reported calling students to gather information needed to complete the Student Tracking Table. Another consortium reported using a third party to track students and provided that third party with a student list

Exhibit 11 - Forms used by consortia to collect data for the OEPM System

Information Types	Consortium 1	Consortium 2	Consortium 3	Consortium 4
Award Profile	**Awardees Authorization form** (agreement about data sharing) **Longitudinal Tracking Agreement Form** (includes contact information for longitudinal tracking) Awardees/Applicant Information Form (demographic, instituting info) *Sent to Awardees*	**Excel sheet** that lists past student awardees' name to be used for longitudinal tracking and collect information for current year awardees (includes significant investment and other awardees) *Sent to Affiliates*	**Student Profile Form**: Pre and Post Survey (students fill out at the time of receipt and after the activity. *Sent to Awardees* **Student Award Program Acceptance Guidelines** (student signature to provide data and information, e.g. tax)	Not available
Longitudinal Tracking	**Longitudinal Tracking Agreement Form** (includes contact information for longitudinal tracking) Ask for third party *Sent to Individual awardees*	Send an ***e-mail*** *to* ***each student*** and ask to report their enrollment or employment information that aligns with Student Table B) The excel sheet (see above)	Called students whose record was found	**4.Longitudinal tracking sheet** *Sent to Affiliates*
Project and participants	**Higher Education** **OEPM online form** **Informal Education OEPM online form**	**Final Report form** that includes all program form and core form information *Sent to Affiliates*	**Curriculum Development Form** **Hands On Training Form** **Informal Ed Form**	**Affiliate Reporting Sheet** ***Sent to affiliate*** **Competitive Reporting Form –*Sent to affiliate and directed to PI***

	Pre College OEPM Online Form **Research Infrastructure Form** *Sent to Awardees (PIs)*		**Pre College Form** **Research Infrastructure Form** *Sent to affiliate*	**(**Both form collects information asked in OEPM about project activity and participants. Each form covers data for all program activity form and core form)
Other		Final report form includes expenditure table *		Affiliate Financial Sheet*

Note: An excel table that includes same categorization of expenditure with Expenditure Table, filled out by each affiliate, meaning affiliate level aggregated data.

Different Project Reporting Periods

Responses by the consortia indicated that when they entered data in the OEPM system to report FY 2013 performance, they used different cut-off dates for the performance period for which they reported data. While one consortium reported the performance of their grant year, i.e., starting with the anniversary date when their grant was awarded, other consortia reported that either they roughly followed their grant year, or their reported performance period for the OEPM reporting did not correspond with their program's fiscal year. For example, one consortium reported since the OEPM due date was about 30 days after their Space Grant fiscal year end date, it included activities that happened during this 30-day period.

Another consortium reported that it set a specific date, two months before the OEPM due date, as the end date of activities being reported as FY 2013 performance data. A few consortia reported that they try to align activity and other data with expenditures that are made during the Space Grant fiscal year. For example, one consortium reported that it limited its activities during summer because the OEPM's due date was May 1st in FY 2013, but its fiscal year ended in July.

Project Activity Start/End Dates

The consortia reported they collect project activity information, such as description of activity, types of student team, education enhancement, partnership with NASA center, start/end dates, and the number of event and workshops, from principal investigators or affiliates by using the forms that they created by following the OEPM's core form and project activity forms. Of many data requested by the OEPM system, the team asked the consortia how they define project start date and end date as the team thought this may be used for understanding the duration of the project activity.

In the OEPM system, it is listed as "Project Activity Date: Start: (grantees enter month/date/year) End: (grantees enter month/date/year)." Consortia's responses to the question demonstrated that they used different ways to report project start and end date as follows:

- For internship, the applicant provides start and end date. As for teacher workshop or higher education programs, it is usually our fiscal year, if more than [one] workshop, the way they gave us a proposal.

-
- I have sent the reporting to be for that semester that they worked on activities and preparations for the two-day activity. So then do they well do I count all those five months that I spent preparing for the activity? Or just the two days of the actually event.
- Usually, if it is a teacher workshop, they put the start and end date of the workshop and not include planning.

Definitions of "direct participants" and "significant investment"

The OEPM system requested the consortia to enter both "direct" and "indirect" participants by type, such as undergraduate, graduate, post doc, faculty, elementary teacher, middle school teacher and so on. The consortia's response about what "direct" and "indirect" participants aligned with the definition provided in the OEPM. According the OEPM system, "Direct participants are individuals that and that are direct beneficiaries of the activity (i.e., participants and or attendees that may have registered for the activity), indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated (i.e., students that participate in revised courses that were developed via activity funds" (NASA OE, OEPM Slide, 50).

When asked if consortia count participants who registered for workshop or who actually came to the workshop, four of the five Consortia shared that they reported people who actually came to the workshop. (Note: The team did not ask this question to one consortium). Comments provided by a few consortia suggested that the validity of data may vary, and consortia may vary in the way they verify direct participant numbers reported by principal investigators or affiliates. One consortium reported that although affiliates are "required to try and do sign-in sheets for everyone who is showing up, sometimes they are better than other times." Another consortium reported that as for direct participants, the university or organization provides a report with the final invoice, which suggests that this consortium might have cross referenced the number with the invoice. Another consortium reported that higher education faculty has resisted collecting number of students and other detailed information asked by the OEPM system. This consortium reported:

- I think most valid [data in OEPM] is usually how the faculty member describes the results or the activity. They usually don't like to ... So many of the faculty members that I work with do not want to get involved in the minutia, and what they consider bothersome, picky details, as to exactly how many students there were. They just want to be [sic] able to say, a lot of students. So when the team asked them to be specific and do sign-in sheets they get frustrated with that guidance. But they ultimately do provide that information [Interview]

Two consortia reported a concern about the validity of the number of students. One consortium reported when students were not funded by Space Grant, but the Space Grant funds a principal investigator to conduct a project in which students participate as direct participants, the principal investigator might not report an accurate number of student direct participants if students leave the project in the middle of the project. Comments provided by consortia suggest that they try to get accurate numbers. Two consortia reported based on the number reported, calling affiliates to ask how they report indirect and direct participant numbers. One consortium shared it reported indirect

participant numbers if the principal investigator reports that they heard from teachers that they went back and taught students.

Number of students who received "significant investment"

Space Grant required the consortia to track students who received significant investment. Consortia report individual student information, and they track these students and report in Student Table B (longitudinal tracking). The general guidance by NASA OE about students who received significant investment is as follows: "A significant award is a monetary award, internship or experience which includes one or more of the following: (a) has a value of greater than or equal to $5,000; (b) participation of greater than or equal to 160 hours; and/or (c) through a cost-benefit analysis proves to have significant impact on the student's academic achievement and employment." Student Table, Definition Sheet, FY 2013 data call). However, according to the OPEM training slides: "A significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support, 160 or greater hours of direct contact, or some other support considered 'significant.'" For some projects, the minimum level determining significant investment may be greater (NASA OE, OEPM slide 70), and it was found that of the four Consortia that used forms to collect information, two of them (including one who reported it followed NASA OE's definition of significant investment) included the definition that appeared on the OEPM Training slides in their data collection forms. Consortia did not always follow the definitions provided by NASA OE.

- Only one consortium reported it followed the definition "strictly," but it had not used the criteria in the Student Table Definition Sheet, saying "The guidance are [sic] simple enough that we have always just followed a) and b)"
- Another consortium reported it used the definition element of b) participation of greater than equal to 160 hours. "We expect 10-20 hours or more of participation per week. Either [the] student [is] being [engaged] ten hours a week or being mentored for 10 hours a week without pay. The team leans more on contact hours."
- One consortium reported using a different definition. This consortium "define(s) a significant investment as a student who receives twenty-five hundred dollars or more. Because we are a smaller state, we give smaller awards, so that way we have more students to track. Because if we did five thousand, we wouldn't be tracking very many students."
- Another consortium reported that it follows NASA definition of a) and b) but it has one exception where students who received much less amount of investment is recorded as receiving significant investment. "We have one program with minority institutions where we provide funding to [buy] textbooks. That was significant because without that these students won't have access to textbooks. In most cases, it is about…money but there is one project where we consider this to be very significant because without that they would not be able to take part in that program at all."

Finally, one consortium's comment suggested that students' self-report was an important piece of information to define if students received significant investment in Research Infrastructure and Higher Education. The comment below also suggests that as of now, this consortium defines significant investment as meeting all three conditions.

- The amount of money was kind of an issue. Because sometimes they [students] didn't get paid at all. Sometimes they just wanted to do it. But because in the past that caveat that, did that event or activity make a significant impact on that student. If the student self-reported and said that it had, then we at that time and we would count them as significantly impacted. Not so much anymore now, because it's not if they meet two of these criteria. It's really do they meet all three of the criteria? So I think it's more stringent now. Numbers will probably go down for some people, because of the funding capacity that we have for students. But that is how it's reported through the PI. So the campus PI then would then report the students, they're time and effort, the amount of money they received or didn't receive. And then we would contact the students with a follow up and get their demographics, and again ask them what they received from it. As far as funding, time and effort, and whether or not it was a significant impact on their trajectory. (NV. IV)

Taken together, the reports by consortia indicated that students who are reported as receiving significant investment could mean different types and scale of investment from receiving a $5000 to supplementary contribution, such as receiving money to buy textbooks. The consortia's view of what "significant" investment means for their students appears to shape the definition the consortia used. Either consortia will need to report their respective definitions, or NASA OE will need to enforce a standard definition, preferably relying on quantitative financial criteria alone.

Student Award Data

As reported in the section, how consortia collected and validated data, consortia reported collecting information about students through an application form or through a form that collects information needed for the OEPM system's Award Profile.

Of the five consortia, two consortia reported that the lead institution managed Fellowship/Scholarship and competitive awards. These two consortia reported that they collect students' demographic information before the first payment by using a form that asks the same questions listed in the Award Profile.

Two other consortia reported the following challenge of collecting students' information that are required in the Award Profile, which derives from varying policies within their higher education institutions about what information can be collected. When we asked how they collected information for award profiles, below are responses from the two consortia:

- This one has probably been our biggest headache… It's been a real struggle for us to get all of the ... I guess I would call it the student's specific information. Then also, the affiliates are really confused because it seems like in every institution, there are different rules on what they can and can't share in terms of information on students. I think we've met the bare minimum expectations. It's been a challenge; I won't lie to you.
- That's pretty tricky because there's so much with personal privacy issues. And to make sure that, because all of our competitions are merit based, strictly merit based, we don't ask for demographics at all until after the competition has been completed and reviewed on the basis of merit. Then, once we notify students that they received a scholarship, et cetera,

part of their required activity before ... Well, I can't even say before, because once they've been funded we fund them. But we sort of insist that they provide, basically, an agreement to abide by ... Various information. There are a number of things that they have to know. Number one, are you a US citizen? They have to sign off on those types of issues. Part of that then goes into a demographic questionnaire that our staff's created [the data collection form the Consortia use] that asks all the basic demographic that NASA asks us to collect. The team can't make it mandatory. Some students do not want to answer those questions and refuse to. Unfortunately, that probably does sometimes skew our demographic numbers. But it does go out in the questionnaire after they've been funded.

Student Tracking

As reported in the data collection process section, consortia used different approach to track students.

- One consortium reported using the third party organization (Space Grant Foundation) to collect this data. The Consortium provides the student list and the Space Grant Foundation provides the Student Table B.
- The other four consortia collected information from their affiliates. One consortium sent a list of students who received significant investment to each affiliate to update student information. This consortium reported that affiliates ask their department or career center to check student status and send back information. Based on this report, the consortium compiled Student Table B.
- As for the rest of the three consortia:
    - One consortium sends the longitudinal tracking form (the same format with Student Table B) to each affiliate to fill out the table.
    - Another consortium reported it contacted students whom the consortium funded the year before. This consortium reported the data collection was "hit and miss."
    - For the remaining consortium, representative staff could not explain how affiliates collected student information because the person who collected that information no longer works with the consortium.

Consortia reported different levels of success to track students. One consortium that sent a list of students who received significant investment the prior year reported they had "pretty good luck with our students." Each affiliate contacting department and career center, and reaching out to students' mentors, this consortium reported, "I don't think we've ever had any time yet where there's just zero information that we found on them." Another consortium reported the student tracking was a "hit or miss." This consortium described the data collection for FY 2013 performance reporting as follows:

- For 2013 I contacted the students who we funded the year before to see if they were still ... Were they still undergraduates? If they came in and received an undergraduate scholarship, were they still undergrads, or had they graduated? Had they joined a master's program? If not, were they working? Again, that we would employ the survey that our staff created.

> Because we had the student e-mails for the last two years, our staff ... Well, at that point it was me. I would contact the students and ask them to update their information.
> Sometimes I would call them if I had their phone number, check with their faculty members. Sometimes even call the departments and ask, is this student still enrolled? What's going on with them? It's hit or miss and it's not a clean process. It's been such a time consuming effort.

Taken together, consortia vary with what data they have about student longitudinal tracking. As for FY 2013 performance reporting, at least one consortium requested aggregated information from affiliates, while others appear to have individual student list. Also, the comprehensiveness of student tracking, as reported by Consortia, varied.

Definition of "affiliates"

In the OEPM system, each project activity should list affiliates and non-affiliates participating. When we asked how Consortia decide which affiliates to list for each project activity as "participating," Consortia's responses varied:

- One consortium reported reporting affiliates that received funding or their students received funding. The lead institution of this consortium manages all competition.
- Another consortium reported each affiliate that ran each project activity reports which affiliate members are participating in the project activity. This means that there is a possibility that each affiliate uses different definition of "participating"
- Another consortium reported affiliates participating means if affiliates is either contributing funds or spending funds.

Another consortium reported if it is "directly participating." This consortium includes all four and two year colleges as participating for scholarship program. When it comes to other projects, such as robotics, only a few affiliates are "participating."

Sub-elements

As indicated in the section on the data structure of the OEPM system, selection of sub element influenced the types of data collected for each project activity. When asked how consortia decided which sub-elements (i.e. Fellowship/Scholarship, Research Infrastructure, or Higher Education) to mark for each project activity, consortia reported as follows:

- Three consortia reported they marked only one sub-element for each project activity.
- Two consortia reported multiple sub-elements marked for each activity. These two consortia reported each affiliate selects sub-elements to be assigned for each activity.
- Of the three consortia that reported making only one sub element for each project activity, two consortia reported the lead institution manages competitions.

CONCLUSIONS AND RECOMMENDATIONS

The NASA Space Grant College and Fellowship Program (Space Grant, or Space Grant) is one of two components of the NASA OE Higher Education Aerospace Research and Career Development (ARCD) Program. Space Grant is managed at the national level by an OE Program Manager. Space Grant is a state-based program operating under cooperative agreements with a lead university in each of the respective jurisdictions and managed by a common director at that level. NASA funds 52 Space Grant Consortia across the 50 states in addition to the District of Columbia and the Commonwealth of Puerto Rico. The three objectives of this technical assistance that spanned both phases are as follows:

i. To fully document the current SG program model, including inputs, strategies/activities, outputs, and short-, intermediate-, and long-term outcomes in consultation with the SG stakeholder community;
ii. To conduct an assessment of performance data, reporting and program documentation held by SG consortia and the NASA OE to ensure that appropriate, valid and reliable data are collected to document SG strategies/activities, outputs, and outcomes at the consortium and national levels;
iii. To prepare a design and plan for an external evaluation study and make formal recommendations to improve NASA's performance monitoring and preparedness for future SG program evaluations based on a thorough review of previous evaluations, consultation with the SG community, and the results of the assessment of performance data, reporting, and program documentation.

LOGIC MODEL

At the start of this project, no Logic Model was provided. A significant accomplishment of this project was the development of a Logic Model that was subsequently revised based upon stakeholder feedback. With respect to the Logic Model, NASA should consider the following recommendations:

- Logic Model outcomes should also be in the Agency Performance Indicators (APIs) and/or performance goals.
- The Logic Model should be used with consortia and community stakeholders to illustrate the goals, strategies, objectives, outputs and outcomes of the Space Grant program. The Logic Model can also be used as a guide among consortia for strategic planning.
- Increase the number of site visits to help consortia improve management processes.
- Include qualitative data collection and analyses of report data to obtain more in-depth insight of Space Grant success and impact.

The proposed logic model, as developed through this technical assistance, is available in the proposed evaluation plan in Appendix A. It should be noted that further refinements to the logic model as a result of the proposed evaluation are possible. As a result of interviews, the following long-term outcome may be considered by stakeholders to be the most import: contribute to the

development of the science, technology, engineering, and mathematics (STEM) workforce in disciplines needed to achieve NASA's strategic goals (employ and educate).

DATA QUALITY ANALYSIS

Based on the interviews with the consortia, the following observations about the validity and reliability of data collected in the OEPM system are presented:

- **Project activity information:** Data do not seem to be reliable across the consortia since consortia reported different definitions for data elements. For example, consortia reported using different definitions of **project start and end date**.
- While it seems that all consortia used a similar definition of **direct participants**, (i.e., people who actually came to the workshop or people who actually worked on a research project) there may be some variance because, as consortia reported, the guideline of collecting signup sheets was not always followed, or there was no such specific guidance.
- **Longitudinal tracking data** do not seem to be reliable across consortia because consortia used different definition of "significant investment" and consortia used different methods of tracking students. Unless there is a documentation of different definitions used by each consortium and how they collected the data, it will be difficult for the external evaluators to sort out which consortia data are comparable.
- **Outcome data,** (i.e., publications, additional funding, technology transfer, and patents) are valid data because they can be corroborated by using data from sources external to Space Grant (i.e. the US Patent and Trademark Office), thus potentially reliable across consortia. However, the evaluator may need to confirm that the publication data are comprehensive because if project activity is solely marked as fellowship/scholarship, publication data are not recorded in the OEPM system.
- As for **student data in Award Profile**, as presented in award profile section, some consortia may not have captured all students' information.
- The **performance period** varies by consortia. This means, the numbers reported to OEPM system for a particular fiscal year do not cover the same time period.

Based on the review of Survey Monkey and OEPM data, the team identified only a small number of data elements collected in Survey Monkey and/or the OEPM system over at least a two-year period were relatively high quality, meaning the data are possibly valid and reliable across consortia. The team rated the following data as valid because the aggregated number reported can be traced back to the raw data, the data were reported by using standardized methods, or the data can be validated by using other sources. These data are as follows:

- Institution type of affiliates and if they are Minority Serving Institutions (MSIs) in Survey Monkey (by cross referencing with information reported in Annual Performance Data Report) and in the OEPM system.
- The number of fellowship/scholarship recipients and their demographic and other information in the OEPM system.
- The number of students who received a significant investment and their demographic and other information in the OEPM system.

- The number of new or revised courses in the OEPM system. As for FY 2010-2011, only aggregated numbers were available in Survey Monkey.
- Publications, invited papers, papers presented, patent, technology transfer, additional grant and their amount were saved in the OEPM system. As for FY 2010-2011, only aggregated numbers were available in Survey Monkey.

Another consistently collected data element was tracking data of students who received a significant investment, which was reported in Student Tables. However, since they are aggregated numbers, the evaluator will need to find out how each consortium collected and validated the data.

It is important to note that these data were self-reported by the consortia, and some consortia had more thorough data collection and validation processes than others. For example, from an interview with a consortium director, we learned that when consortium personnel changed, this consortium had a difficult time tracking students who received a significant investment and if these students advanced to STEM employment (Student Data Table). Consequently, this consortium might have under-reported the number of students who had advanced in the STEM pipeline. In addition, from a data quality perspective, the current data entry procedures of the OEPM system may not be the best way to collect sensitive information, such as disability status. Some people may not want to disclose sensitive information not knowing who will be entering the data into the OEPM system, consequently, there may be underreporting of personal information.

Transition from Survey Monkey to OEPM

The team aligned question items that asked for the almost same information across the two data collection instruments. As described in the findings section, the unit of data collected by these two instruments differed between Survey Monkey and the OEPM system. While the OEPM system allows to link activity duration, participating affiliates, and outcome data, such as publication, additional funding and technology transfer, with each project activity, Survey Monkey presents these results at the program element or a group of program elements.

Based on the review data (Phase I) and Consortia director interviews (Phase II), the team rated the validity and reliability of the data for each data element. They assigned “low” to validity when we found one of the followings:

- Definition of the data reported was not clear, or varied by affiliates. When this was the case, the team looked if raw data were available. If they are not available, since there is not a way for the future evaluator to trace back to verify the accuracy of data, the team rated low.
- Data collection was not comprehensive. This includes the following situations:
    - when the team found descriptions in the response in Survey Monkey or when they heard Consortia reporting their data collection may not capture everyone. For example, we rated low on the number of direct participants because we heard Consortia reporting not all affiliates could utilize sign in sheet to count participants. This means the number reported as direct participants may not have captured all actual participants.

- Consortia reported there is no guidance on how to collect data or how to make a decision about what to be included for a specific data question. This means there is a possibility that affiliates used own interpretation of what to report. For example, the team rated "low" on start and end date of each project activity because some Consortia directors reported they relied on affiliates' report and they reported the definition was vague. This means, even within one consortium, the definition of start and end date may vary by activities or affiliates.

Challenges and recommendations regarding OEPM reported by the consortia

Consortia directors reported many challenges with regard to the OEPM system. Data entry is very time consuming, because of the amount of information that need to be entered for student profile. Consortia do not have sufficient staff/time to enter data to the OEPM system. The particular way data entry is set up in the OEPM system makes data entry more time consuming. One consortium commented:

- After you enter every student, you have to exit out of that part and start from the beginning again. If there's some way to allow us to import an excel file that would fill in slots automatically or check box, it would be much easier.

The consortia also reported technical problems with the OEPM system. The consortia reported OEPM system shuts down and the data they entered were not saved, which requires additional work to them. This system failure is particularly challenge because current OEPM system allows consortia to enter data only a limited time.

- We spend an hour or two inputting data; the next time we go into the system all the work was gone. Some sort of program error.
- The period of time that we actually have to go into the OEPM system and report is very limited. Sometimes, it shuts down completely. If we could make any changes and keep that open on a regular basis, so that as activities occur and they' re fresh in everyone's mind, if we could go in immediately and report on that activity, I think the data would be much more reliable.

Access to the OEPM system requires a long time according to consortia staff. One consortium reported, "Our new director [waited] for half a year before [she] was given access. [She] still has not been engaged on reporting because of [the] access issue."

The consortia provided the following improvement recommendations:

- Uploading a spreadsheet to enter student award profile information, rather than consortia staff members typing in each student's information.
- Having a longer period of time to have access to OEPM, like a "standard regular monthly basis."

Another aspect of the consortia's recommendation is on the quality of data and the need for the data that can reflect the quality of programming.

- One consortium clarified that it is important to collect all data, but reporting on individual student is not critical to Space Grant, and reporting to the OEPM or to NASA OE should be a summarized form of data. This consortium reported that the data that would be reported [to the OEPM and NASA OE] could show "strategic impact rather than raw data."
- Another consortium commented the importance of consistency in the data reported for the OEPM system. "It is not just an issue of valid and reliable, but consistency. Consortia run different programs in different ways. There are different sub elements. It would be good for NASA to come up with more training or some kind of guidance document to help people know how they should be categorizing their strategies and programs, mapping activities to the strategic objectives."
- *Let's say there are only six kids in a project and five go on. Another program has twenty kids that moved on out of forty. Twenty moved on, but it was not a good as retaining students." "We need to get to a deeper level to see how effective Space Grant program are.*

All-in-all, consortia expressed concern over the number of data points required by OEPM. For potential reporting format, consortia expressed concerns that OEPM system tend to collect quantitative data, but they believe qualitative data convey the quality of the programming.

PROPOSED EVALUATION PLAN

One of the goals of this technical assistance task order was to prepare a design and plan for an external evaluation study. Appendix A proposes an evaluation plan for the Space Grant program. Given the data limitations and comments regarding the evaluation questions described in the findings sections above, the evaluation design presented therein is preliminary and subject to change. In order to answer these evaluation questions, it is necessary to articulate an evaluation design that includes (1) the approach to responding to each question, (2) a description of the specific program activities that are the focus of the evaluation question and anticipated outcomes based on existing or newly collected research evidence, (3) a sampling strategy (as appropriate), (4) a strategy for engaging stakeholders to participate in the evaluation study, (5) data collection methods, and (6) data analysis methods appropriate to responding to the evaluation questions.

Evaluation Framework

A useful way to summarize the elements of the evaluation design and approach is an evaluation framework. The following exhibit presents a preliminary evaluation framework for the Space Grant Program.

Exhibit 12 - Evaluation Framework

Evaluation Question	Type	Evaluation Approach	Data Collection Approach	Data Analysis Approach
EQ1a. Are Space Grant activities being carried out in compliance with Public Law 100-147?	Normative	Discrepancy Evaluation—requires operationalizing PL requirements.	Gather all available Space Grant activity descriptions from APD Reports, OEPM data, and State Consortia records	Qualitative—Comparison of documented Space Grant activities against PL requirements
EQ1b. Are Space Grant activities being carried out in alignment with the priorities of NASA OE and NASA research and technology development?	Normative	Discrepancy Evaluation—requires operationalizing NASA education and NASA research and technology development priorities.	Gather all available Space Grant activity descriptions from APD Reports, OEPM data, and State Consortia records	Qualitative—Comparison of documented Space Grant activities against NASA education and NASA research and technology development priorities
EQ2a. To what extent are funded activities engaging the intended populations (i.e., diverse students, faculty, and institutions) as defined in the 2010 solicitation?	Descriptive	Descriptive assessment of available program data.	Gather all available Space Grant funded activity descriptions and engaged populations information from Student Data Tables, ADP reports, and selected OEPM data	Quantitative--Descriptive analysis of number/percentage of populations engaged
EQ2b. To what extent are funded activities meeting program goals as defined in the 2010 solicitation?	Normative	Discrepancy Evaluation—requires definition of 2010 solicitation goals.	Gather all available Space Grant funded activity descriptions from Student Data Tables, ADP reports, State Consortia records, and selected OEPM data	Qualitative--Comparison of documented activities and 2010 solicitation goals
EQ3. To what extent do the methods of soliciting applications or requests, review of those requests, and awarding and distributing Space Grant funds support the quality of the results?	Descriptive	Multiple Case Study	Gather all available Space Grant funded activity descriptions from Student Data Tables, ADP reports, and selected OEPM data; operationalize "quality of results"	Quantitative—relationship between methods and quality of results; Qualitative—examine association of methods and quality of results as reported by Consortia
EQ4a. What effective practices exist in Consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields?	Descriptive	Multiple Case Study	Gather all available Space Grant activity descriptions from APD Reports, OEPM data; Interviews with State Consortia Directors	Qualitative--Descriptive analysis of Space Grant Consortia practices identified as "effective" and their relationship to university resources expended
EQ4b. To what extent do these practices ensure the quality of results?	Cause & effect	Multiple Case Study	Gather all available Space Grant activity descriptions from APD Reports, OEPM data	Qualitative—descriptive relationship between effective practices and quality of results
EQ5. What have been Space Grant's major contributions to NASA's education mission?	Normative	Discrepancy Evaluation—requires definition of "major" contributions	Gather all available Space Grant activity descriptions from APD Reports, OEPM data	Qualitative—Comparison of documented Space Grant activities against NASA education mission
EQ6. Given the national investment in Space Grant program, what, if any, new approaches to the management of Space Grant program should NASA consider for the future?	Descriptive	Summative Evaluation	Gather all available Space Grant activity descriptions from APD Reports, OEPM data; Interviews with State Consortia Directors	Qualitative—identification of new approaches to the management of Space Grant program
EQ7. In all, what are the challenges, barriers, and constraints encountered in ensuring high- quality results?	Descriptive	Multiple Case Study—requires definition of "high quality" results	Gather all available Space Grant activity descriptions from APD Reports, OEPM data; Interviews with State Consortia Directors	Qualitative—identification of challenges, barriers, and constraints encountered in project activities yielding high quality results

Evaluation Questions

Discussion occurred in Phase II regarding the viability of the preliminary list of evaluation questions.

- **EQ1.** Are Space Grant activities being carried out in compliance with Public Law 100-147 and in alignment with the priorities of NASA OE and NASA research and technology development?
- **EQ2.** To what extent are funded activities engaging the intended populations (i.e., diverse students, faculty, and institutions) and meeting program goals as defined in the 2010 solicitation?
- **EQ3.** To what extent do the methods of soliciting applications or requests, review of those requests, and awarding and distributing Space Grant funds support the quality of the results?
- **EQ4.** What effective practices exist in Consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields? To what extent do these practices ensure the quality of results?
- **EQ5.** What have been Space Grant's major contributions to NASA's education mission?
- **EQ6.** Given the national investment in Space Grant program, what, if any, new approaches to the management of Space Grant program should NASA consider for the future?
- **EQ7.** In all, what are the challenges, barriers, and constraints encountered in ensuring high- quality results?

It should be noted that there was consensus across discussion group participants in Phase I that it would be both difficult and unnecessary to rank or prioritize the questions on the list as they were all deemed equally important. The first major result of discussion was the development of suggestions for revisions to the existing questions. For example, one participant wanted the questions reworded so they are not "not posed in such a way that they asking if we do comply with these things, we have no choice in complying with these things. It's required." Although, this particular recommendation certainly carried the assumption that all stakeholders do everything that is required of them, the point was articulated that it would be more politic to ask "how" – as opposed to "whether" – grantees were in compliance. Possible additional questions forwarded during discussion included issues of degree completion, career matriculation, and identification of successful program models. Several participants offered commentary and revisions around question 1. The first major comment addressed applicability of the legislation referenced in the question.

- *I went and found Public Law 100-147. I read through it. I found that only Title II really concerns us of that law. I pulled out sections 203 and 209 that I felt or sorry, 203, part of 204 and 209 that I felt really was something that we address because the whole law doesn't fully concern Space Grants. It's related to NASA with that Space Grant.*
- *I think it would be nice if when asking the question number one if the key points of Public Law 100-147 could be illuminated. I said illuminated not eliminated. I think that would be nice. I also went in and found the priorities of NASA OE which we see in every one of our*

proposals because in every solicitation they are restated because NASA OE would like us to address these, so we're aware of where those are, but I think it would be nice when asking that question to list what they are, and then for NASA Research and Technology Development, those are really based on the priorities of each mission directorate.

Furthermore, it was argued that the multipart nature of question 1 was problematic.

- *Is it in compliance with public law? […] Does it align with the priorities of NASA education? […] Question 3, alignment with the priorities of NASA research and technology development. […] It needs to be clarified and suggest breaking that up in to I, IA, IB and IC or something so that it isn't just a straight yes or no.*

Altogether, it was clear that the first question was most in need of revision. Multiple participants in Space Grant Directors group noted that questions numbered 2, 4, and 5 help measure program impact. Likewise, participants noted numerous challenges that may be answers to question 7. One potential challenge was the growing burden of reporting, specifically increasing complexity and duplication of reporting. Poor communication between Space Grant Consortia and various NASA entities, mission directorates, and NASA centers was another challenge identified. From the NASA Staff Interviews, we were provided some operationalization of some of the evaluation questions, as well as insight regarding NASA expectations with regard to State Consortia activities. The following are selected summaries of what was learned.

- **Evaluation Question 1.** Education staff agreed that Evaluation Question 1 aligned with both NASA OE priorities and the Public Law 100-147. However, it was noted that priorities changed annually. "In order for the program to remain relevant year to year, we would provide what would be the priorities or key areas of emphasis on an annual basis because those would shift and change as the Agency shifted." Participants noted that the NASA OE priorities reflect those for the 2010 period and are the same ones that Consortia addressed with original proposals. The participants said changes to priorities were then communicated to Consortia during annual meetings. They also stated that priorities had to comply with the strategic coordination framework and at the time they were Outcomes 1-3, although Space Grant shifted away from these in 2015. The federal government also switched its focus from PART measures to performance goals and annual performance indicators (APIs) during this time as well as performance assessment measures.
- **Evaluation Question 2**. One staff member said that NASA should clarify their definition of "diverse" in Evaluation Question 2 because diverse "does not just mean under-represented and underserved populations and it did not just mean women". This participant explained that "diverse" also refers to the type of institutions and whether a range of institutions were represented by faculty and students in the Consortium. This participant also noted that race and ethnicity of faculty were also considered.
- **Evaluation Question 3.** One staff member stated that NASA needs to clarify whether Evaluation Question 3 is referring to a program management and execution perspective. Specifically, this participant thought it was unclear whether the question was referring to a) the solicitation and proposal review process at the headquarters level as it relates to base awards, multi-year renewal, annual renewals, and additional opportunities, or b)

identifying successful processes or approaches that a consortium would use as they look at competitively awarded funds. Another staff member said that "It is important to have questions at the national and Consortium levels, looking at the intake for proposals and then looking at the Consortium level – assuming this process is different." This answer led the technical assistance team to recommend preparing both national level as well as state Consortium-level program logic models.

- **Evaluation Question 4.** Education staff stated that they had not done anything related to effective practices, and that the last five-year evaluation period covered the period of 2003-2007. All data collected from Consortia are self-reported including the self-evaluation that covers how Consortia work and whether their practices were effective. The next iteration of the evaluation was suggested to include program-wide effective practices. It was also discussed that the Annual Performance Document (APD) documents that Consortia completed annually included self-reported, anecdotal data. For the award, Consortia submit APDs to the program office, and the APD compares their proposal with their reached goals (results and milestones). Space Grant staff reviews and gives feedback and/or mentorship opportunities based on achievement, exceeding goals, or issues. There is some best practice data related to undergraduates moving through graduate school that includes longitudinal tracking and best ways to track students. There is also a mid-course assessment of the 2010-2015 awards that is meant to detect deficiencies or weakness and is used to create an improvement plan.
- **Evaluation Question 6.** With regard to new approaches to the management of Space Grant, staff discussed an "improvement practice," where Space Grant is looking into progress of Consortia at the midyear point to give struggling Consortia quicker feedback and a chance to improve their performance prior to the 5- year assessment period. Staff also mentioned that a survey of all affiliates has been completed. Some trends of that data have shown Consortia success to "revolve around the quality of the director." NASA OE staff were adamant that they would like the opportunity and resources to do more site visits to improve management.

As a result of all these lessons learned, the Paragon TEC recommends some modifications to the evaluation questions, as listed in the proposed evaluation plan (Appendix A).

RECOMMENDATIONS

This section presents recommendations for a data collection and performance monitoring system. The recommendations are based on the data quality assessment, community consultation, and interviews with Space Grant directors. The first section addresses NASA OE's requirement that this report provides recommendations to improve its data collection. The second section is a list of recommendations on its performance monitoring system. Since NASA OE has not defined the Space Grant model(s), yet the recommendations focus on the steps NASA OE can take to create a performance monitoring system and to improve data quality.

Data Collection

NASA Office of Education (OE) will need to prioritize data collection required for agency-level performance reporting because the data quality assessment found that a limited number of data elements were comparable across Space Grant consortia to capture program activity, outputs and outcomes. In order to reduce the burden of data collection, Paragon TEC recommends NASA OE to collect the following data that are required by the 2014-2016 NASA Strategic Plan and not to require consortia to report other data if they are not required for other reporting purposes.

- For each fellowship/scholarship recipient and student who received a significant investment, the following information: gender, race, ethnicity, disability status, and institution name.
- The number and type of direct participants to each of Space Grant project activity.

To ensure data reported by consortia are valid and comprehensive, NASA OE should consider the following recommendations:

- NASA OE should review if consortia could collect demographic information of students who received fellowship scholarship and other award and direct participants without any difficulty, such as institutional policy that limit access to student information. NASA OE should establish data collection agreements subsequent to awards so that all awarded and participating students' demographic information can be collected.
- NASA OE should require consortia to report their respective definitions of "significant investment" used for each student reported. At this moment, Paragon TEC cannot recommend which definition to use and if all consortia should use the same definitions. This decision should be made after NASA OE defines Space Grant program model(s) and after NASA OE ensures that the definition aligns across NASA OE programs because the data are used for NASA agency level reporting. For the reporting, Paragon TEC recommends the significant investment is $5,000 or more of monetary award during a project performance year rather than the current definition that includes three conditions. However, Paragon TEC expects that without a consensus about Space Grant program model(s), the definition Paragon TEC proposes is meaningless for measuring program performance.
- NASA OE should require all consortia report their data collection methods including any uncertainty, such as potentially missing data. This documentation is very important to inform the validity of performance data when the data are presented to groups that are external to Space Grant program.
- NASA OE should institute uniform data collection. NASA OE should monitor data quality with respect to direct participant attendance for all project activities. For example, NASA OE might require a sign-in sheet that should be signed by participants on the day of the activity in order to provide verification for the numbers reported.
- NASA OE should directly communicate with principal investigators of awarded projects or other people who actually collect the data, if consortia do not change the current management and data collection system. The interviews with Space Grant directors informed that often times when each affiliate manages a project, each affiliate that was awarded the grant collects data and Space Grant directors do not have a direct control over the data collection, which makes it difficult to control the quality of data. NASA OE staff

should regularly go over the data reported by consortia and go over with the consortia director, a staff who is responsible for entering data in the OEPM system, and people who actually collected data to discuss how data were collected.

Office of Education Performance Monitoring System

NASA OE requested Paragon TEC to present formal recommendations that include:

- Performance data,
- Collection methods,
- Reporting procedures,
- Guidelines on improving the quality of Space Grant data and
- Recommendations to improve the five-year program review, including its methods and instrumentation.

Without final, approved Space Grant logic models, it is not feasible for Paragon TEC to develop instrumentation that aligns with the models. Below, we present our recommendations on approaches NASA OE may want to take to collect and report data and guidelines to improve data quality.

NASA OE and consortia will need to agree on the Space Grant model, variations, and common objectives in order to create a performance monitoring system. Consequently, NASA OE needs to decide on the program model or set of models and align the data to be collected. The present technical assistance made it clear that, without a common objective, each consortium will create its own performance objectives and data to report. At a minimum, Space Grant may need to be delineated into groups of consortia with the same characteristics. For example, consortia that have a NASA Center within their boundaries may share similar challenges, strategies and outcomes; consequently, they may be categorized into one group. The performance monitoring system should be developed based on the program model(s).

Performance data

Decisions about if NASA OE should stop collecting data that are currently collected by OEPM system should be made based on the Space Grant model(s). The current logic model includes all activities and strategies that some consortia do and others do not. NASA OE needs to refine the logic model(s).

From the strategies, outputs and outcomes, Paragon can suggest data that can inform if consortia achieved outputs and outcomes, for example:

- the number of new or revised courses (output: number of courses developed),
- number of Research Infrastructure project activities that offered onsite NASA experience, (output: collaborative efforts with NASA personnel and facilities),
- number of project activities that targeted secondary students and that are implemented between June and August (short term outcomes: provide summer opportunities on college

campuses for secondary students with the objective of increased enrollment in STEM disciplines or interest in STEM careers),

These data are already collected in the OEPM system, regardless of their quality. As the interviews with NASA OE staff and Space Grant directors found, some of these outcomes do not apply to some consortia.

From the interviews with NASA OE staff, we learned a few elements of the program are shared among consortia and they are priorities of Space Grant. In addition to the data Paragon recommended in the section of data collection, the team recommends NASA OE continue collecting the following data that reflect core elements of Space Grant Program:

- Data on affiliates and non- affiliates. This informs NASA OE of affiliate and non-affiliate involvement in project activities and identifies the affiliate as a community college or a MSI, as diversity is an important element of Space Grant goals and objectives.
- Track participants longitudinally to capture if they are in the STEM pipeline or employed in a STEM field. NASA OE may need to specify a number of years after participation for tracking. In the interview, one consortium director mentioned that there had been a confusion among consortia directors about how many years they need to track students. In addition, the data quality assessment found that the quality of data was not consistent across consortia. NASA OE should provide technical assistance to consortia to collect data or request professional services to track students.

Survey Monkey defined revised and new courses, publications, presentations, technology transfers, and additional funds as outcomes. Our data quality assessment rated them as potentially valid and reliable data as they could be verified by using other sources, they are not found in the revised logic model. NASA OE may want to reconsider whether these outcome data during FY 2010-2011 performance reporting are sufficiently related to the Space Grant Program model.

Collection methods

Currently, lead institutions or affiliates collect data, and NASA OE staff does not have control over how consortia collected and compiled data. NASA OE staff raised concern of data quality because they are self-reported and the majority of data could not trace back to raw data to validate accuracy. Paragon TEC presents the following recommendations:

- Consider consolidating tracking of student at NASA OE and use a professional service to conduct employment and enrollment verification. This will reduce variance among consortia in the comprehensiveness of student tracking and reduce the burden on consortia.
- Consider making the OEPM system accessible to participants and awardees so they can enter their personal information to the system directly. This will allow activity participants to sign in on the day of the event.
- If consortia have to collect data on students, and it is not an option for students or participants directly enter information to the OEPM system, consider creating the functionality for the OEPM system to upload a data file, rather than making consortia to

enter individual student information each by each. This will reduce the burden and data entry error.

- NASA OE should review if institutional policy prevents consortia from collecting student or participant data. NASA OE should establish data collection agreements subsequent to awards so that all awarded students' demographic information and participant information can be collected.
- Since students' institution, academic major, and addresses may change during their scholarship/fellowship or during the time they work on a research project, NASA OE should require consortia to verify student information at least twice, at the beginning of the award period and end of the award period, so the latest information will be saved in the OEPM system.
- NASA OE should review the OEPM system to confirm if the current structure reflects the relationship among resource, activity, outputs and outcomes envisioned by the Space Grant models. The way forms are structured in the OEPM system is based on a different activity-outcome relationship from Survey Monkey.
- NASA OE should clarify the role of the program elements (i.e., Fellowship/Scholarship, Research Infrastructure, Higher Education Program, Pre College, and "Informal Education) in relation to project activity. Consortia varied in data reporting and their understanding about the relationship between sub elements and project activities. Some consortia strictly assigned only one project element to one project activity, while other consortia marked multiple sub elements.

Reporting procedure

Reporting procedures should be set by NASA OE and should align with the OMB reporting requirements. NASA OE should set the cut-off date of the program performance period that consortia report to the OEPM system. The reporting procedures should be annual and reporting should align with the program performance period. As described in the findings from the data quality assessment section, differences in performance periods for Space Grant make it difficult to document what was the progress and outcomes made in a certain project year. NASA OE should determine whether aligning performance reporting period is possible in order to streamline data collection as well as to make data comparable both vertically across years and horizontally across consortia.

Since consortia are unique in state need and interest, programming, strategies, outputs and outcomes, Annual Performance Data Report should include consortia's logic models, including theory of action. The current Annual Performance Data Report does not specifically ask what are state interest and needs and how consortia's programming respond to them. NASA OE staff should provide close support to consortia to create and use logic models, as well explain why they need to create and revise logic models.

Guidelines on improving the quality of SG data

NASA OE should consider instituting the following guidelines to improve the data quality of the OEPM system.

- Consortium should present documentation on data collection, uncertainty about the comprehensiveness of the data collection.
- The data collection plan should be reviewed by NASA OE prior to the project activity. NASA OE staff should monitor and provide technical assistance to ensure consortia collects high quality data.
- NASA OE should require consortia to submit supporting document, such as sign in sheet, if an electronic sign in sheet linked to the OEPM system is not available.
- NASA OE should collect supporting documents soon after the event occurred, and OEPM system should be accessible to consortia anytime.
- NASS OE should create data collection templates to be used by lead institution and affiliates to collect data. The template should include data definitions, data collection timing, and verification methods.
- NASA OE should monitor the data entry and data quality and provide technical assistance, guidance and training to consortia on data collection and reporting. Monthly calls with the consortia to review data quality and data collection, providing data definitions, and facilitating group meeting of several consortia where data collection, data quality, and discussion on performance data are recommended.
- NASA OE should explain why consortia need to collect data and how the data will be used so consortia understand the importance of high quality data.

NASA OE should publish a program-level annual performance report in order to inform consortia about the status of the program and data quality. The report should provide a reference point for each consortium about program characteristics, area of focus, outputs and outcomes, to articulate the Space Grant model and the diversity of the consortia. The report should also include information and the ways of documenting strategies and qualities of the programming, which consortia views as important data to capture the Space Grant program.

Navigating the transition from Survey Monkey to OEPM

NASA OE should consider the following recommendation:

- The Core Data Form should be attached to the Fellowship/Scholarship sub-element in OEPM in order to better track outcomes (publication, presentation, technology transfer, patent, and funding information), which were not found from the OEPM system.

Future evaluators of Space Grant should be aware that:

- OEPM and Survey Monkey connected program elements to program outcomes differently.
- Based upon the Survey Monkey structure:
    - Publications, patents, and technology transfer were outcomes of the three program elements
    - Acquiring additional funding was an outcome of Research Infrastructure and Higher Education.

APPENDIX A: PRELIMINARY EVALUATION PLAN

The primary components of the plan are:

i. Evaluation questions and the approach to responding to each question;
ii. Evaluation design, with NASA's stated preference for a rigorous design;
iii. Description of the specific program activities that are the focus of the evaluation study and anticipated outcomes based on existing research evidence;
iv. Sampling strategy (as appropriate);
v. Strategy for engaging stakeholders to participate in the assessment study;
vi. Data collection methods;
vii. Data analysis methods appropriate to responding to the assessment questions;
viii. Approach to informed consent/protection of human subjects (as appropriate);
ix. Design issues and risk mitigation strategy;
x. Data collection schedule and overall project timeline; and
xi. Reporting, including a proposed table of contents for each major report deliverable.

I. PROPOSED EVALUATION QUESTIONS

The following section summarizes the proposed evaluation questions and information regarding how these questions were derived from the original evaluation questions provided by NASA.

EQ1a. Were Space Grant activities, as defined in the 2010 solicitation, carried out in compliance with Public Law 100-147?
EQ1b. Were Space Grant activities, as defined in the 2010 solicitation, carried out in alignment with the priorities of NASA OE and NASA research and technology development?

Explanation: EQ1 was modified to address the double-barreled nature of the original question (two questions being asked in one question). Further, stakeholders suggested that the elements of the Public Law, as well as NASA education priorities and NASA research and technology development priorities be fully defined and operationalized for properly addressing this question. Finally, stakeholders opined that because priorities changed annually during this time period (2010-2014), it may be difficult to measure compliance and alignment.

EQ2a. To what extent did funded activities engage the intended populations (i.e., diverse students, faculty, and institutions) as defined in the 2010 solicitation?
EQ2b. To what extent did funded activities meet program goals as defined in the 2010 solicitation?

Explanation: EQ2 was modified to address the double-barreled nature of the original question. Further, stakeholders suggested it will be important to operationally define "diversity" as it relates to the student, faculty, and institution.

EQ3. To what extent did the methods of soliciting applications or requests, review of those requests, and awarding and distributing Space Grant funds at the National as well as consortium levels support the quality of the results?

Explanation: This question was modified to include a suggestion to examine how the methods employed at the National as well as consortium levels affected results. The term "quality" was also identified as needing definition with suggestions related to outputs and outcomes (e.g., publications, presentations, conferences; dosage and exposure; student engagement in hands-on activities; and success of students in STEM majors and careers).

EQ4a. What "promising" practices exist in Consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields?
EQ4b. To what extent are these practices related to the quality of results?

Explanation: EQ4 was modified to address the double-barreled nature of the original question. This question was further modified to change "effective" practices to "promising" as there is no effectiveness data in order to address this contract. Finally, the term "quality" was also identified as needing definition with suggestions related to outputs and outcomes.

EQ5. What have been Space Grant's major contributions to NASA's education mission?

Explanation: No changes were suggested by stakeholders for this evaluation question, yet the term "major contributions" needs definition. It will be important to look for changes in the NASA OE mission, policies, or practices that may have been influenced or related to specific Space Grant activity.

EQ6. Given the national investment in Space Grant program, what, if any, new approaches to the management of Space Grant program should NASA consider for the future?

Explanation: No changes were suggested by stakeholders for this evaluation question, yet stakeholders suggested a formative approach to measure consortia annual progress and practice at the mid-year point to provide feedback and permit performance improvement (possibly helping to define a "promising" practice).

EQ7. In all, what are the challenges, barriers, and constraints encountered in ensuring high-quality results?

Explanation: No changes were suggested by stakeholders for this evaluation question, yet the term "quality" requires definition as stated in comments related to EQ3 above.

II. Evaluation Design and Sampling Strategy

The proposed evaluation design is a rigorous mixed/multiple methods design, involving secondary analysis of available data and clustered multiple case study approaches to answer the descriptive, normative, and cause-and-effect evaluation questions.

III. Anticipated Activities and Outcomes

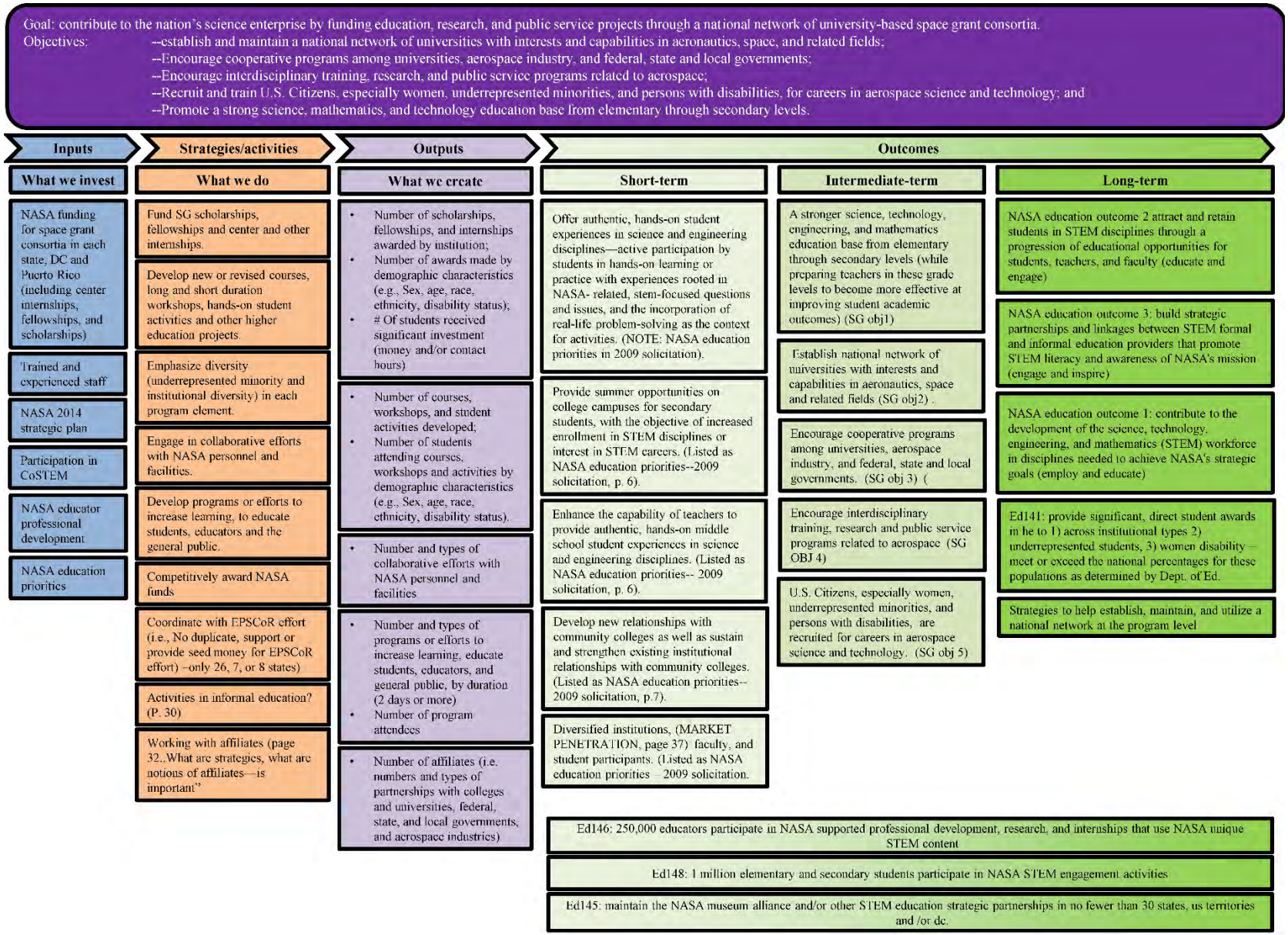
An important consideration of an evaluation design is a program Logic Model. The proposed Space Grant Logic Model for 2010-2014 (next page) was reviewed by both NASA Space Grant staff as well as State Consortia Directors; it serves as the platform for the evaluation design by enumerating the specific program activities that are the focus of the evaluation study and anticipated outcomes based on existing research evidence. One of the first steps in the evaluation design and implementation process will be to carefully review the proposed logic model to ensure all elements of the model accurately reflect Space Grant program, and that all elements are sufficiently operationalized to permit rigorous measurement.

IV. Sampling Strategy

This design capitalizes on both the availability of consistently collected data across all participants, as well as in-depth study of smaller groups of selected participants (5-7 state consortia) who are purposively sampled to be similar on key dimensions (such as program focus). The sampling criteria for the clustered case studies will be developed and presented to NASA. Given the time and resource constraints, there will likely be no more than four groups of State Consortia sampled for this evaluation. The proposed mixed methods design emphasizes efficiency, minimizes the data collection burden on state consortia, and provides a rigorous way to tell the story of the Space Grant program.

V. Strategy for Engaging Stakeholders

The evaluation plan also includes the formation of an expert stakeholder panel that will serve to help develop and review the progress of the evaluation, including sampling design, data collection tools and field procedures, interim and final results, and reporting. The expert stakeholder panel will be comprised of 8-10 State Consortium directors and data staff from a sample of States whose projects have not been selected for the in-depth case studies. The States will be selected to ensure a reasonable representation of geography, project focus, grant size, and other variables determined to be important to NASA. The evaluation team will contact State Consortia directors from selected States in order to secure their participation. The expert stakeholder panel will meet on at least two occasions to review the study design and proposed data collection protocols and again to review preliminary results and reporting. If the budget and project timeline permit, additional meetings will be scheduled.


Goal: contribute to the nation's science enterprise by funding education, research, and public service projects through a national network of university-based space grant consortia.
Objectives:
--establish and maintain a national network of universities with interests and capabilities in aeronautics, space, and related fields;
--Encourage cooperative programs among universities, aerospace industry, and federal, state and local governments;
--Encourage interdisciplinary training, research, and public service programs related to acrospace;
--Recruit and train U.S. Citizens, especially women, underrepresented minorities, and persons with disabilities, for careers in aerospace science and technology; and
--Promote a strong science, mathematics, and technology education base from elementary through secondary levels.
Inputs
Strategies/activities
Outputs
Outcomes
What we invest
What we do
What we create
Short-term
Intermediate-term
Long-term
NASA funding for space grant consortia in each state, DC and Puerto Rico (including center internships, fellowships, and scholarships)
Trained and experienced staff
NASA 2014 strategic plan
Participation in CoSTEM
NASA educator professional development
NASA education priorities
Fund SG scholarships, fellowships and center and other internships.
Develop new or revised courses, long and short duration workshops, hands-on student activities and other higher education projects.
Emphasize diversity (underrepresented minority and institutional diversity) in each program element.
Engage in collaborative efforts with NASA personnel and facilities.
Develop programs or efforts to increase learning, to educate students, educators and the general public.
Competitively award NASA funds
Coordinate with EPSCoR effort (i.e., No duplicate, support or provide seed money for EPSCoR effort) –only 26, 7, or 8 states)
Activities in informal education? (P. 30)
Working with affiliates (page 32..What are strategies, what are notions of affiliates—is important"
• Number of scholarships, fellowships, and internships awarded by institution;
• Number of awards made by demographic characteristics (e.g., Sex, age, race, ethnicity, disability status);
• # Of students received significant investment (money and/or contact hours)
• Number of courses, workshops, and student activities developed;
• Number of students attending courses, workshops and activities by demographic characteristics (e.g., Sex, age, race, ethnicity, disability status).
• Number and types of collaborative efforts with NASA personnel and facilities
• Number and types of programs or efforts to increase learning, educate students, educators, and general public, by duration (2 days or more)
• Number of program attendees
• Number of affiliates (i.e. numbers and types of partnerships with colleges and universities, federal, state, and local governments, and acrospace industries)
Offer authentic, hands-on student experiences in science and engineering disciplines—active participation by students in hands-on learning or practice with experiences rooted in NASA- related, stem-focused questions and issues, and the incorporation of real-life problem-solving as the context for activities. (NOTE: NASA education priorities in 2009 solicitation).
Provide summer opportunities on college campuses for secondary students, with the objective of increased enrollment in STEM disciplines or interest in STEM careers. (Listed as NASA education priorities--2009 solicitation, p. 6).
Enhance the capability of teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines. (Listed as NASA education priorities-- 2009 solicitation, p. 6).
Develop new relationships with community colleges as well as sustain and strengthen existing institutional relationships with community colleges. (Listed as NASA education priorities--2009 solicitation, p.7).
Diversified institutions, (MARKET PENETRATION, page 37) faculty, and student participants. (Listed as NASA education priorities – 2009 solicitation.
A stronger science, technology, engineering, and mathematics education base from elementary through secondary levels (while preparing teachers in these grade levels to become more effective at improving student academic outcomes) (SG obj1)
Establish national network of universities with interests and capabilities in aeronautics, space and related fields (SG obj2) .
Encourage cooperative programs among universities, aerospace industry, and federal, state and local governments. (SG obj 3) (
Encourage interdisciplinary training, research and public service programs related to acrospace (SG OBJ 4)
U.S. Citizens, especially women, underrepresented minorities, and persons with disabilities, are recruited for careers in aerospace science and technology. (SG obj 5)
NASA education outcome 2 attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty (educate and engage)
NASA education outcome 3: build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (engage and inspire)
NASA education outcome 1: contribute to the development of the science, technology, engineering, and mathematics (STEM) workforce in disciplines needed to achieve NASA's strategic goals (employ and educate)
Ed141: provide significant, direct student awards in he to 1) across institutional types 2) underrepresented students, 3) women disability – meet or exceed the national percentages for these populations as determined by Dept. of Ed.
Strategies to help establish, maintain, and utilize a national network at the program level
Ed146: 250,000 educators participate in NASA supported professional development, research, and internships that use NASA unique STEM content
Ed148: 1 million elementary and secondary students participate in NASA STEM engagement activities
Ed145: maintain the NASA museum alliance and/or other STEM education strategic partnerships in no fewer than 30 states, us territories and /or dc.

VI. Data Collection Methods

Evaluation questions about compliance (EQ1) and engaging the intended populations (EQ2) will be addressed across all 52 state consortia through secondary analysis of common data elements found in OEPM, including (1) Institution type of affiliates and if they are a Minority Serving Institution, (2) The number of fellowship/scholarship recipients, as well as their demographic and other information, (3) The number of students who received significant investment and their demographic and other information, (4) The number of new or revised courses, and (5) Publications, invited papers, papers presented, patents, technology transfers, and additional grants and their amounts.

These secondary data will be supplemented with information maintained by state consortia regarding their activities and results (state consortium archival data) and primary data gathered from state consortium staff, affiliates, and partners through in-depth interviews for the expressed purpose of telling the state consortium's story about activities and results. The in-depth interview protocols will be developed and tested with the assistance of the expert stakeholder panel and approved by NASA. These more in-depth data, collected across samples of 5-7 state consortia, will be used to address questions about effective practices (EQ4), major contributions (EQ5), and challenges, barriers, and constraints encountered in ensuring high-quality results (EQ7).

Proposed Data Sources

Primary sources of data for the evaluation included:

- **Annual Performance Data (APD) Report**: An annual report for Consortia to report goals, accomplishments, contributions to PART measures (until FY 2012) and NASA priorities, and improvements made. Consortia provided the information in a narrative form. Consortia submitted APD report 60 days before the grant anniversary date, which varied by Consortia. NASA OE reviewed the report and provided guidance to improve program performance of each consortium. There was no program wide annual performance report.
- **Student Data Tables**: Consortia reported the number of student participants and their demographics, number of students receiving significant investment[10] from NASA by program elements. The Consortia also reported tracking data of students who received significant investment. Students were tracked to see if they continue with STEM field and employed in STEM field. NASA OE sent an excel file to each consortium, and the due date of submission was the same date with Performance Data Request due date.

[10] According to NASA Office of Education's document associated with Performance Data Request, significant investment is defined as follows: a monetary ward, internship or experience which includes one or more of the following characteristics: Has a value of > = $5,000, Participation of >= 160. However, in another document (OEPM training document), significant investment is defined as follows: "A significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support, 160 or greater hours of direct contact, or some of other support considered "significant.", For some projects the minimum level determining significant investment may be greater" (OEPM Slide 90).

- **Expenditure Report:** Consortia reported expenditures by program element. An excel file was sent to each consortium to provide the data. The due date was the same with the due date of Performance Data Request.
- **State Consortia Data Files and Records:** Consortia keep their own records and data regarding activities and performance for federal as well as more local reporting. These files are reported to contain information pertaining to issues such as implementation challenges, effective practices, and changes made to improve performance.

VII. Data Analysis Methods

Data analysis will include descriptive statistical analysis for most quantitative data (e.g., counts, percentages, ranges, etc.), as well as content analysis and ethnographic analysis for the qualitative data (e.g., thematic analysis of interview and focus group transcripts and ethnographic analysis that focuses on constant discovery and constant comparison of relevant situations, settings, styles, images, meanings and nuances). The aim is to be systematic and analytic, but not overly rigid as to miss the diversity and uniqueness of state consortium implementation and results. Furthermore, the qualitative data analysis approaches employed will be done so that the sampled Consortia stories are told, including challenges, barriers, and approaches for addressing and overcoming those challenges and barriers.

VIII. Approach to Informed Consent/Protection of Human Subjects

The evaluation team will submit all proposed instruments and protocols through an Institutional Review Board (IRB) that has a Federal-wide Assurance on file with OHRP in order to ensure protection of human subjects. The team may request that the instruments and protocols for the Space Grant evaluation be exempt from IRB approval, as the additional instruments suggested are focused on processes of implementation, and perceived program impact and do not require personal behaviors or sensitive information. No incentives should be offered for participation in any of the evaluation activities. However, all individuals in the study will be informed that their participation is helping to improve NASA's educational programming in order to prepare for wider dissemination and greater effectiveness.

IX. Design Issues and Risk Mitigation Strategy

Risks to Participants

There are no foreseeable risks to the participants in this study, since the surveys and process instruments do not include sensitive or personal items. In addition, no one but the evaluation team will know how any individual participant responded to survey or interview items since only the evaluation team will have access to a) participant names associated with the surveys or interviews, and b) the crosswalk of ID numbers and participant names.

Confidentiality & Anonymity

To ensure confidentiality and participant comfort, the following safeguards will be put into place to protect the information provided through all instruments:

1. Participant names will be changed to IDs once received and these IDs will be prepopulated on the surveys. Thus, only the evaluation team will have access to the crosswalk of IDs and names which will be kept in a password-protected file;
2. All electronic files, including qualitative and quantitative data, will be stored on password protected computers and password protected servers, which are backed up daily, within a secure firewall with only a subject study number as an identifier;
3. All completed hard copies of data collection forms will be kept in a secure locked location at all times and accessed only by members of the evaluation team;
4. All hard copy surveys and forms will be kept for 12 months and all electronic data files will be maintained for a period of three years beyond the termination of this project and then destroyed;
5. Only authorized evaluation staff will see completed surveys; and
6. No data will be reported for individuals and names of participants will not be identified in any reports on this study.

Possible Limitations

There is one primary limitation identified with the evaluation plan as presented – the available secondary data—and it has a number of associated sub-risks. Through the assessment of data quality, it was found that the validity of data is affected by multiple factors. The lead institution of each Space Grant Consortium had different levels of control over the quality of data, which partly derive from how Consortium manage the grant. When the lead institution manages the funding competitions, they get data directly from awardees. So, some Consortium collected information directly from students or PIs, while other directors relied on affiliates' reporting. Some Consortium collected pre and post information, while other Consortium collected data only once. Furthermore, institutional policy on information collection made it difficult for some Consortium to collect student information, which is required by OEPM system to measure diversity.

In general, there is a mismatch between how the data system is structured and how Consortia manage their programs. While the way Survey Monkey was structured organizes Space Grant as consisting of the five elements--sequencing data reporting for one element to the next element--for some Consortium, this is not the way it conceptualized the program. Some Consortium linked one project activity with one sub element, while other Consortium conceptualized one activity addressing multiple sub elements. We did not find guidance document how Consortia should conceptualize the relationship between sub element and project activity. It seems allowing two approaches is a problem because it will report different number of activities when NASA OE reports the number of activity

by sub elements addressed. The data structure of OEPM and Survey Monkey suggest different activity and outcome links, which will also present difficulty for NASA OE to compile a performance report.

Since the performance period of each Space Grant is different as grants were awarded on different days, when Consortia reported data to OEPM (which presses a specific due date for all Consortia), Consortia reported data on different performance periods. The OEPM due date did not provide a common cutoff date for Consortia, which makes it is difficult for comparing and compiling performance data.

In order for Survey Monkey and OEPM data to be used for evaluation, the evaluator will have to learn from each Consortium:

a. how it defined potentially critical data elements, for example: significant investment, direct participants, participating affiliates, and various descriptions characteristics of project activities.
b. how it assigned sub elements to each project activity.
c. how comprehensively it collected data. Some Consortia reported challenges of collecting data.

As for the scope of evaluation, as the phase one report concluded, program data were not comparable across the five-years. In addition, Consortia differed in their data collection approaches and how they reported data. The evaluation should select Consortia that have relatively high quality data. The following strategies will help compensate for these data quality issues:

1) consulting with participating awardees about their data;
2) identifying an evaluation point of contact at each site;
3) assigning a designated external evaluator member for communications with sites; and
4) close monitoring of evaluation activities and progress toward data collection goals.

X. Data Collection Schedule and Overall Project Timeline

The proposed evaluation is anticipated to require nine months to implement completely. The first two months will be spent refining the evaluation design with the expert stakeholder group, developing the secondary data analysis models, conducting preliminary interviews with state consortia staff, and preparing primary field data collection protocols and tools for review and approval. The following 4 months will be spent gathering primary and secondary data, and the last three months will be dedicated to preparing the clustered multiple case studies, summarizing and integrating the findings from the quantitative and qualitative data, and preparing the final report.

XI. Reporting

The proposed final report will include the following sections:

I. **EXECUTIVE SUMMNARY**
II. Introduction
III. Purpose of the Evaluation
IV. Evaluation Questions
V. Evaluation Methods
    a. Sampling design
    b. Data collection
    c. Data analysis methods
VI. Findings
    a. Secondary Analysis
    b. Case Studies
VII. Conclusions and Recommendations
VIII. References
IX. Appendixes

The final report will contain all necessary text, tables, graphs, and graphics to tell the Space Grant story, and include technical appendixes to supplement the narrative report. The final report is expected to contain no more than 50 pages.

APPENDIX B: INTERVIEW PROTOCOLS

KEY STAKEHOLDERS

The SOW identifies four key stakeholder groups, as follows:

- Space Grant Affiliates
- NASA Education Coordinating Council
- National Council of Space Grant Directors
- National Space Grant Foundation

Dr. Shaffer has recommended the following three participants for inclusion:

Michaela Lucas	**Susie Johnson**	**Dr. John Gregory**
Associate Director	Program Manager	Professor and Director
Nebraska Space Grant	Idaho Space Grant	Alabama Space Grant

The Paragon TEC team will include the above three recommended participants in appropriate group, if at all possible. Based on their titles, the most obvious is to include them in the group of National Council of Space Grant Directors.

As instructed in SOW (page 7), to identify discussion group participants, we will contact:

- Leadership of the Education Coordinating Council (Donald James, Associate Administrator for the Office of Education),
- National Council of Space Grant Directors (Steve Ruffin, Chair, Paragon TEC team was introduced to him on Nov 12, 2014), and
- National Space Grant Foundation (Mike Fisher, Executive Director).

Paragon TEC's team will request up to nine representatives from each group. In order to identify nine representatives from Space Grant Affiliates, we will first contact to the leadership of the National Council of Space Grant Directors and ask to recommend nine representatives from the Affiliates based on the criteria of recommendation. We will create the criteria of recommendation of the nine participants as we conduct interviews with NASA staff and through the review of evaluation reports (task b). Once the team identifies potential participants, we will request contact information.

Additionally, the discussion group conducted by Dr. Shaffer will be used as secondary data as the discussion groups are reviewed upon completion. A brief overview of that group follows:

Discussion Group Conducted by Dr. Shaffer in October in Cocoa Beach

Participants involved:

- Colleen Fava, *Louisiana Space Grant Consortium, Program Manager*
- John Wefel, *Louisiana Space Grant Consortium, Director*
- Jamie Foster, *Florida Space Grant Consortium, University of Florida (affiliate)*
- Gerardo Morell, *Puerto Rico Space Grant Consortium, Director*
- Cassandra Runyon, *South Carolina Space Grant Consortium, Director*
- Wanda Pierson, *Georgia Space Grant Consortium, Program Manager*
- Janet Lumpp, *Kentucky Space Grant Consortium, Associate Director*

The discussion moderator will cover all the discussion topics presented below in each group but will only pull use a couple of the questions noted under each category per group. This is to ensure consistency in topics while ensuring variety in data collected across and within groups. Furthermore, this is done to comply with time constraints and PRA requirements. In short, the protocols below provide a wide assortment from which the moderator can select *a la carte* to suit the flow of discussion, and no question will be used in more than one group.

Introduction (5 Minutes)

Thank you for taking time today to speak with us today about National Space Grant College and Fellowship Program. My name is ----------. I work for Pacific Institute for Research and Evaluation (PIRE). Paragon TEC and PIRE have a contract with NASA Education to support future assessment of results of activities funded through the National Space Grant College and Fellowship Program FY 2010 NASA Training Grant Announcement and make formal recommendations to improve NASA's performance monitoring and preparedness for future SG program evaluations. The NASA Office of Education is interested in hearing from various stakeholders of Space Grant program about their views of Space Grant and future evaluation.

This discussion group conversation was convened as part of a community consultation and research effort. This is in an effort to support the assessment of results of activities funded through the National Space Grant College and Fellowship Program FY 2010 NASA Training Grant Announcement and to help shape future assessment efforts. These activities are overseen by the NASA Office of Education Infrastructure Division, which includes among its responsibilities oversight of performance measurement and evaluation of NASA Office of Education programs.

The current effort has several objectives, which are:

i. To fully document the current SG program model, including inputs, strategies/activities, outputs, and short-, intermediate-, and long-term outcomes;

ii. To conduct an assessment of performance data, reporting and program documentation held by SG consortia and the NASA Office of Education to ensure that appropriate, valid and reliable data are collected; and
iii. To prepare a design and plan for an external evaluation study and make formal recommendations to improve NASA's performance monitoring and preparedness for future SG program evaluations.

During today's discussion, I would like to ask you about your perspective on how the SG consortia have been reviewed in the past and how consortium performance monitoring and reporting is currently conducted by NASA. Rubrics from the last SG program review are available, and I encourage you to point out examples of effective or ineffective rubrics during our discussion. Also, available for reference are the draft research questions for the FY2010 SG evaluation. Today, we will discuss the appropriateness of these questions and other topics to talk about the most relevant information sources for responding to the questions. You may not be able to provide a response on all topics based on your individual experience, but all the responses you provide will be valued. Please know that there is no "right" answer. We deeply appreciate your time. Our conversation today will last no longer than two hours.

Before we begin our conversation, I have some group norms that I am asking each of you observe:

1. First, please do not identify yourself or other people or state consortia by name when you talk. You might say instead, for example, "another state consortium," "a consortium director" or "a NASA staff member or leader."
2. Secondly, please respect everyone's point of view. You do not have to agree with one another about everything.
3. There are no right or wrong answers here. Everyone's opinions and contributions are valuable and appreciated.
4. Because your comments are being recorded and transcribed from an audiotape, I ask that one person to speak at a time. Otherwise, your comments will not be heard and recorded accurately.
5. Finally, please respect the confidentiality of this discussion by not repeating or discussing comments made during this session with others who did not participate.

Before we begin, do you have any questions? *[pause for questions]*

*[start audio-recording]*I am audio-recording today's discussion for the purpose of transcribing your comments for analysis. Once the transcript has been produced, I will check it for accuracy and destroy the audio recording. The transcript will not be saved on a NASA server and once our final report is approved by NASA, the transcript will be destroyed. I'm sharing this information as an assurance that all responses will remain confidential. Your responses will only be shared with other members of the data analysis team. Further, I will ensure that any information included in their report does not identify individuals. You are free to withdraw from this discussion at any time. Let's take a few minutes to introduce ourselves…

Topic One (30 minutes)

The focus of the first part of our discussion today will be on the SG program model and its goals, objectives, key strategies/activities, outputs, and outcomes.

a. Based on your experience, we would like to get your understanding of the SG Program model.
    i. How familiar are you with the SG program as a whole? Please describe the SG program from your perspective.
    ii. How effective is it?
    iii. What are its strengths? Weaknesses?
    iv. How could the model be improved?
    v. What recommendations do you have for increasing the effectiveness of the model?
    vi. What is the purpose of the SG program? What types of projects do grantees engage in?
    vii. Please describe the official goals and objectives of the SG program.
    viii. Are there other secondary goals? What are they?
b. How would you describe your current role(s) and functions with the program model?
    i. Please explain your involvement in the SG program either individually or as the agency/organization. What is your role?
    ii. What activities or strategies have you had a role in or had dealings with? How was this experience?
    iii. Please describe your experiences with the program.
c. How has the SG program developed over time?
    i. How would you like to see the program evolve over time?
    ii. How have goals and objectives of the program changed throughout your time working with the program? What additional changes do you think need to be made?
    iii. What outputs and outcomes have you seen produced by the program (at a national level or at your consortium)? How productive have these been? How could these be improved?
    iv. What key strategies and activities have changed over time? Which others do you think should change in the future? How? Why?
    v. What factors are affecting program implementation? What changes should be made?
    vi. What challenges are facing the program? How can these be overcome?

Topic Two (30 minutes)

Now the topic focus of the second part of our discussion is going to be on Space Grant performance monitoring and evaluation.

a. Based on your experience, we would like to know how SG recipients are currently monitored and evaluated and the documentation that is currently required.

i. What has your experience been with the current SG performance monitoring and evaluation?
ii. From your understanding what current documentation is required for reporting?
iii. How effective and efficient would you say this monitoring and evaluation currently is?
iv. How could the current monitoring, evaluation, and documentation be improved?
v. What are the strengths and weaknesses of the current approach from your view point? What are some of your recommendations for improvement?

b. How useful is the current required documentation in evaluation and monitoring for SG program?
   i. What additional documentation could strengthen evaluation and monitoring capabilities?
   ii. How should required documentation be obtained? From whom? By when?
   iii. How is current documentation reviewed? Should changes be made to this process?
   iv. With whom are the results from evaluation and monitoring shared? Should others be included?
   v. What is generally expected from the grantees? Describe the key activities grantees are expected to engage in.
   vi. What outcomes are grantees expected to achieve? Are these standardized at all or do they vary by grantee? Who establishes the performance expectations for the grantee and how are they communicated to the grantee?
   vii. How have you assessed whether a grantee has met the goals and objectives set out for them in the past?
   viii. Name the types of data collected from grantees? What information must grantees report? How is the data collected from grantees? Is there any standardized reporting across grantees?
   ix. What about standardized data collection? Data collection instruments or protocols?
   x. How have comparison sites been identified, if comparisons have been made?

Topic Three (25 minutes)

Our third discussion topic will be focused on research questions that the NASA Office of Education has drafted for a proposed external evaluation study. Copies of these questions (Appendix C) were emailed to you and can be found on the screen now for your convenience. We would like your feedback on these questions.

a. Which questions would you prioritize on this list? Why?
b. Which questions would you delete on this list? Why?
c. What questions might you suggest in their place?

d. Which questions would you suggest be reworded? If so, how would you like to see them revised?
e. Will any of these questions address the issue of measuring SG's impact? Why or why not?
f. Looking at each question in turn, what are appropriate sources of information to respond to each question? Is this data that NASA currently has access to? [data you are already collecting]
g. To what extent does the consortium actually measure the short, intermediate, and long-term goals and objectives of the SG program?
h. To what extent are funded activities engaging the intended populations (i.e., diverse students, faculty, and institutions) and meeting program goals as defined in the 2010 solicitation?
i. What effective practices exist in consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields?
j. To what extent do these practices ensure the quality of results?
k. What have been the SG's major contributions to NASA's education mission?
l. In all, what are the challenges, barriers, and constraints encountered in ensuring high-quality results?

Topic Four (30 minutes)

The last topic for discussion today will be centered around the performance data reporting and data source requirements imposed by NASA on the SG consortia. This is the data currently reported by consortia into OEPM but over the five-year period associated with the current grant period, it has been reported through several systems, including Survey Monkey. I am going to ask you some specific questions about various aspects of data reporting, then will invite you to make any overall comments about data reporting that you feel are important to share with NASA.

a. Performance Data Reporting/Student Data Tables
    i. To what degree is it easy or challenging to distinguish for reporting purposes between students who are listed in the categories of fellows and scholarship recipients, research infrastructure, higher education, and pre-college, and those students who are classified as direct and indirect?
    ii. Have you met with any challenges collecting this data? [Probe for obtaining data from affiliate institutions]
b. Performance Data Reporting/Expenditures: NASA collects from consortia expenditures by project categories (fellowship, research infrastructure, higher education, precollege, informal education, consortium admin costs, and indirect costs) and also sources of funds (including sources other than NASA).
    i. Have you met with any challenges organizing/presenting data by these categories? [Probe for obtaining financial data from affiliate institutions]

ii. On a score of 1 to 5, with 5 being the most confident, what is your confidence level in this data? [Probe for reasons for confidence under 3]

c. Taking an overall view, what comments would you like to share with NASA about performance data reporting?
   i. What data currently exist that you are aware of that can be used to answer the evaluation questions? For example, what data are currently collected from grantees?
   ii. What additional data might be useful to access in order to better answer the evaluation questions?
   iii. How might one get these "other" data?
   iv. What systems are in place to ensure the quality of the data provided to you? E.g., audits, centralized reporting systems, training and TA, etc.
   v. Describe the quality of the various sources of data you currently collect. What are some of the important strengths and weaknesses?

On behalf of NASA thank you for your time and feedback and that concludes our group.

SPACE GRANT DIRECTORS

Thank you for taking time today to speak with us today about the Data Assessment Collection Process for the Space Grant Technical Assistance Project. My name is _____and I am a data analyst with Paragon TEC. Paragon TEC and PIRE have a contract with NASA Education to support future assessment of results and activities for the NASA Space Grant Program and to make formal recommendations to improve NASA's performance monitoring and preparedness. The NASA Office of Education is interested in hearing from various stakeholders of the Space Grant program about their views of the Space Grant and future evaluation.

I would first like to share a little background information on the project:

The Technical Assistance for Program Assessment: National Space Grant College and Fellowship Program project will conduct the following activities under this modification:

1. Refine Evaluation Questions which includes developing an Interview protocol.
2. Conduct a group interview with Office of Education staff engaged in Space Grant implementation. The group will provide a current and historical perspective of Space Grant.
3. Conduct additional review of OEPM data from 2012 and 2013.
4. Conduct up to five interviews with Space Grant Consortia Directors to assess data quality.

This technical assistance task order has three primary objectives:

i. To fully document the current SG program model, including inputs, strategies/activities, outputs, and short-, intermediate-, and long-term outcomes in consultation with the SG stakeholder community;
ii. To conduct an assessment of performance data for 2012 and 2013, reporting and program documentation held by SG consortia and the NASA Office of Education to ensure that appropriate, valid and reliable data are collected to document SG strategies/activities, outputs, and outcomes at the consortium and national levels;
iii. To prepare a design and plan for an external evaluation study and make formal recommendations to improve NASA's performance monitoring and preparedness for future SG program evaluations based on a thorough review of previous evaluations, consultation with the SG community, and the results of the assessment of performance data, reporting, and program documentation.

Interview Process and Confidentiality

We will be audio-recording today's discussion for the purpose of note taking and transcribing your comments for analysis. No names will be included in the transcript and any identifying information that is said in today's conversation will be removed immediately from the transcript. After the transcript is checked for accuracy, we will destroy the audio recording. The transcript will not be saved on a NASA server. Results will be presented in summary form. Once our final report is approved by NASA, the transcript will be destroyed. I'm sharing this information as an assurance that all responses will remain confidential. You do not have to answer any questions that you do not want to and you are free to withdraw from this discussion at any time.

I want to briefly cover some group rules before we start.

6. *First, please do not identify yourself or other people or state consortia by name when you talk. You might say instead "another state consortium," "a consortium director" or "a NASA staff member or leader." In cases where people or organizations are accidentally identified, please be assured that these identifiers will be removed from the transcript and not included in any reporting or communication to NASA.*
7. *Secondly, please respect everyone's point of view, even if you do not agree. Differing opinions are welcome and will lead to greater understanding of the Space Grant program.*
8. *There are no right or wrong answers. Everyone's opinions and contributions are valued and appreciated.*
9. *Because your comments are being recorded and transcribed from an audiotape, I ask that everyone speak clearly and one person at a time to ensure all comments will be heard.*
10. *Finally, please respect the confidentiality of this discussion by not repeating or discussing comments made during this session with others who did not participate.*

Before we begin, do you have any questions? [pause for questions]

NASA STAFF

Purpose of this interview is to:

- Identify data sources and types of data collected and reported by consortium
- Receive inputs on criteria for selecting 12 consortia for in depth data quality assessment
- Learn current approaches to monitoring and assess the performance of Space Grant consortia and to evaluate the national program
- Learn performance data and reports currently collected from Space Grant consortia.

Tasks described in SOW –Task b

The contractor shall interview NASA Office of Education staff as needed to gain:

- an understanding of the program history, goals, objectives, and anticipated outcomes;
- recent Congressional authorization and appropriations supporting SG;
- factors affecting program implementation; and
- challenges, if any, facing the program.

The contractor shall also learn from program staff about:

- current approaches to monitor and assess the performance of SG consortia and to evaluate the national program and
- gain an understanding of the performance data and reports currently collected from SG consortia.

The contractor shall receive copies of all reports and instruments associated with the past two Space Grant evaluation studies

DATE: Wednesday, November 19, 2014 11:00am-
EVENT: Interview with Mike Cherry, NASA Education, Data person
INTERVIEWER:
RECORDER:
NOTE: This is the first interview with Mike Cherry who works on OEPM system. This interview was to respond to Task b and Task c.

[INTRODUCTION]

1.Please describe your involvement in the Space Grant program.

- What are your roles and responsibilities?
- When did you start working on this project?
- How do you work with other NASA staff and stakeholders? How does your work relate to others' work? How do your roles and responsibilities relate to their roles and responsibilities around Space Grant program?
  - Renell (SG Director),
  - Lisa (Research Manager),
  - Patricia (OEID Director/Eval Manager)?
  - Who else do you work with?

[MAJOR ACTORS/STAKEHOLDERS]

2.Who are major actors/groups of the Space Grant program? What do they do in relation to Space Grant program?

- the Education Coordinating Council (NOTE: identified as one of the four stakeholder groups in SOW)
- National Council of Space Grant Directors(NOTE: identified as one of the four stakeholder groups in SOW)
- National Space Grant Foundation (NOTE: identified as one of the four stakeholder groups in SOW)
- Consortium
- Space Grant Affiliates (NOTE: identified as one of the four stakeholder groups in SOW)
- NASA Education staff?
- Anyone else

3.We are provided with the four groups of stakeholders:

1) the Education Coordinating Council (NOTE: identified as one of the four stakeholder groups in SOW)
2) National Council of Space Grant Directors(NOTE: identified as one of the four stakeholder groups in SOW)
3) National Space Grant Foundation (NOTE: identified as one of the four stakeholder groups in SOW)
4) Space Grant Affiliates (NOTE: identified as one of the four stakeholder groups in SOW)

How are they similar and differ?
Do they have different conceptions about the goals of the Space Grant?
How does their involvement with data collection and reporting (here we are taking broad definition, so not limiting to annual performance data) differ?

4.We read Kendra's report, which suggests that consortia tend to decide the scope and activities of Space Grant. Does this reflect your observation? If it does, provide examples in which consortia determine the scope and activities. What are consequences?
For example, consortia can modify what is highlighted in the annual performance data report.

5.What are program implementation challenges consortia experience?
Please provide one example where consortia experienced significant challenges.
Please provide one typical challenge.
How many (out of 52 consortia) experience these challenges? What are consequences?

6. Going back to our question about major actors. Could we say (list stakeholder groups interviewee listed) are stakeholder groups?
Then, how do these different stakeholder groups use data? What are data for them?

(Note: Here we want to have a comprehensive list of data –including both annual performance data and data that are not official..)

7.Is there any specific data one or a couple of these groups value and collect?

8.How does NASA use the data collected and reported by consortia?

9.Who requests progress, output, and outcome data about Space Grant and at consortium level? When does the request come? How does NASA and consortia respond to the data request?

[DATA COLLECTION IN CONSORTIUM]

10.What data collection and reporting requirement do consortia have? What are legal bases for these requirements?

- Annual performance data report
- Anything else?

11.Do consortia provide data on time?

12.Last time, we talked that a data collection system has changed over the grant period. Please confirm our understanding is correct:

- For 2009 data – used previous system
- 2010-2011 data – used survey monkey
- 2012-2013 data – used OEPM system.

Could you describe how consortia collected, reported the data? What was the process?
When the request from NASA went out?
How did consortium collect data? What systems do they use internally?
When did they report the data?
What challenges did they face?
Any observation about data collection process and data quality?

13.What guidance did consortia receive for data collection and reporting?

- What guidance? (and what is the nature of guidance, i.e., requirement, encouragement)
- When do they receive?
- Who in a consortium is responsible for collecting and reporting data?
- Did the guidance change from 2009 to 2014? How did it change? Why?
- How did consortia respond to the requirement from NASA?
- What is the level of strength of the guidance? (legal basis, requirement? Encouragement? Incentives? Sanctions?)

14.How were consortia's data collection and reporting monitored to ensure the quality of data? (and what does high quality of data means here?)

15.Are there any consortia that are different from other consortia in terms of what and how they collect and report data? What makes them different?

[POSSIBLE CRITERIA FOR SELECTING CONSORTIA FOR IN_DEPTH DATA QUALITY ASSESSMENT]
We are planning to select 12 consortia for in depth data quality assessment.

16.We would like to have a variety of consortia in terms of their data collection and reporting capacity in our sample for in depth data quality assessment. Please describe the difference among consortia in terms of data collection, reporting, and the quality of data they report? What make difference in data collection, reporting, and data quality among consortia?

- Are consortia in different types (enhancement, capacity, XXX) different in terms of their data collection, reporting, and data quality?
- Does the size of funding make difference?

17.List three consortia that are consistently providing high quality data.
- What makes these consortia being able to provide high quality data?
- Please define what high quality data means in this context.

18. List three consortia that have significant challenge to provide data?
- What are challenges? What makes these challenges?

19.What efforts were made to improve data quality between 2009 and 2014? (by NASA Education, or other groups) How did data improve?

20.What would you suggest to improve the quality of data collection and reporting by consortium?

[FOR THE REVIEW OF EVALUATION REPORTS ---TASK b]
We are trying to learn history, goals, and data collected for Space Grant program.

21.We are planning to review the following documents. Can you provide these documents?
- Solicitation (2009)
- Congressional justification 2009-2014
- Diane's guidance about data collection and reporting sent to consortium (2009-2014)
- Two evaluation reports
- Rubric used for the review in the 20th anniversary.
- Can we find annual performance data report for 2009-2011? And 2013?

Do you have any suggestions about what else we should be looking at?

[FOR FOCUS GROUP PLANNING – Task c]
22.Please provide the list of

- Affiliates and contact information (one of the focus group target groups).

[CLOSING]
23.Do you have anything else we should be aware of to understand and review the data collected by consortium?

24.Who else should we talk to better understand goals of Space Grant and how consortia collects data?

SPACE GRANT STAFF FOLLOW-UP

AUGUST 17, 2015
2:00 PM

Purpose of this interview is:

- To refine the NASA proposed evaluation questions
- To understand Space Grant Program model at the level of program.

First, we want to gain clarity on the relevance and accuracy of the proposed evaluation questions. Then, we will turn to the logic model.

[REFINING EVALUATION QUESTIONS]

The first proposed evaluation question is:

EQ1. Are Space Grant activities being carried out in compliance with Public Law 100-147 and in alignment with the priorities of NASA Education and NASA research and technology development?
Regarding PL 100-147, the discussion group agreed that the five objectives below adequately reflect this law. We have some follow up questions related to each objective.
Obj 1. Establish and maintain a national network of universities with interests and capabilities in aeronautics, space, and related fields

Q2: What are major strategies to establish and maintain a national network at the program level?
Q3: What are the outcome measures that should be considered?

Obj 2 -Encourage cooperative programs among universities, aerospace industry, and Federal, state and local governments

Q4: What are examples of cooperative programs?

Q5: What are the strategies at the program level that encourage cooperative programs among these groups?

Obj 3. Encourage interdisciplinary training, research, and public service programs related to aerospace;
Q6: In our last discussion we heard that interdisciplinary research or programs were not a key focus. So, we are planning to exclude this question in our final reporting. Can you confirm this is the case? If not, could you please explain?
(Note: At least one consortia talked about public service programs as a central part of their program)

Obj 4. Recruit and train U.S. citizens, especially women, underrepresented minorities, and persons with disabilities, for careers in aerospace science and technology;
Q7: Besides requiring consortia to exceed the state average, what other strategies does Space Grant program use to accomplish this objective?

Obj 5. Promote a strong science, mathematics, and technology education base from elementary through secondary levels.

Q8: Besides funding pre-college programs (i.e., allowing consortia to provide "pre college" programs), what other strategies does Space Grant use at the program level?

Q9: At least one consortia reported pre-college is not their focus. It appears some consortia is doing pre college program more than others. What is the program level strategy on this?

Now, we'd like to move the discussion to whether the SG activities being carried out Align with the priorities of NASA Education

Q10: Based on the previous interview, we understood that the following priorities are not relevant for the FY 2010-2014 evaluation. I will read each one aloud and allow time for you to confirm or disagree that these are no longer relevant**.**
•Engage middle school teachers in hands-on curriculum enhancement training through exposure to NASA scientific and technical expertise. Enhance the capability of teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines. (Listed as NASA Education Priorities-- 2009 Solicitation, p. 6).
•Encourage aeronautics research—research in traditional aeronautics disciplines and research areas appropriate to NASA's unique capabilities, and directly address the fundamental research needs of the Next Generation Air Transportation System (NextGen). (Listed as NASA Education Priorities – 2009 Solicitation, p. 7).
•Support environmental Science and Global Climate Change—research and activities to better understand Earth's environments. (Listed as NASA Education Priorities – 2009 Solicitation, p. 7).

•Enhance the capacity of institutions to support innovative research infrastructure activities that enable early career faculty to focus their research toward NASA priorities. (Listed as NASA Education Priorities – 2009 Solicitation).

Q 11. Based on these comments, we think that Diversity (participants and institutions) and Community College are the priorities that need to be examined at in the evaluation. Do you agree? If not, please explain.

Re: Alignment with NASA research and technology development
Q 12. Based on our previous interview, our understanding is that this is not a relevant priority, so we will not include this question in our reporting. Do you agree?.

Now, we're ready to move on to the next proposed evaluation question.

EQ2. To what extent are funded activities engaging the intended populations (i.e., diverse students, faculty, and institutions) and meeting program goals as defined in the 2010 solicitation?
Q 13. (Asked in the early part of this interview. If we need more information we will ask this question) What are program level strategies to ensure representation of under-represented students?
Q14: Besides OEPM reporting and APD reporting, is there any other data that Space Grant collected that indicate the diversity in participants and institutions?
EQ3. To what extent do the methods of soliciting applications or requests, review of those requests, and awarding and distributing SG funds support the quality of the results?
Q15: What were program level strategies to support quality of results?
Q 16: What should "quality of results" look like at the Space Grant program level?

EQ4. What effective practices exist in consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields? To what extent do these practices ensure the quality of results?

Q 17: What was the program level strategy to promote partnership?
Q18: What was the "quality of results" in this context?

EQ5. What have been the SG's major contributions to NASA's education mission?
Q 19: What was NASA's education mission?
Q 20: Form your perspective, what are the possible contributions you expected to have?

EQ6. Given the national investment in the SG program, what, if any, new approaches to the management of the SG program should NASA consider for the future?
Q 21: What management issues did you notice that are preventing or challenging Space Grant from achieving its outcomes?

EQ7. In all, what are the challenges, barriers, and constraints encountered in ensuring high- quality results?

Q 22: Please operationalize "high quality results" for Space Grant Program?

Now, Let's move on to the Logic Model. Can you all please refer to that document?

[UPDATED LOGIC MODEL]

This is the draft logic model we shared with consortia to get their feedback. Below are some of the comments we received:

- Quality measures are missing from the logic model,
- Not all strategies apply to all consortia; consequently, the outcomes may vary by consortia (e.g. one consortia says Research is central, another says research is not central to their program)
- Having a NASA center makes difference in activities, and consequently outcomes

Do you agree with these comments? If not, which ones do you not agree with? Do you have additional comments about the logic model that we should consider (anything missing or inaccurate?)?

[LOGIC MODEL AT THE PROGRAM LEVEL]

Q1: Does the consortia level logic model apply to the program level logic model? How is the program level logic model different?

- **What is the program level strategy?**
- **One consortia suggested we should link program level strategies with consortia level strategies. What do you think? What would that look like?**

Are there any final comments before we conclude our discussion today?

APPENDIX C: SPACE GRANT GOALS & PRELIMINARY QUESTIONS

Below is a list of 13 mandated Space Grant program goals (or consortia outcomes to be evaluated) and seven evaluation questions proposed by NASA OE. (SOW, pages 17-19)

A. Consortia Outcomes to be Evaluated
The NASA outcome questions posed at the outset will be answered by evaluating the collective outputs of the population of consortia. To what extent have these outputs achieved the following mandated SG program goals?

1. Promote a strong science, technology, engineering, and mathematics education base from elementary through secondary levels while preparing teachers in these grade levels to become more effective at improving student academic outcomes.
2. Establish and maintain a national network of universities with interests and capabilities in aeronautics, space and related fields.
3. Encourage cooperative programs among universities, aerospace industry, and Federal, state and local governments.
4. Encourage interdisciplinary training, research and public service programs related to aerospace.
5. Recruit and train U.S. citizens, especially women, underrepresented minorities, and persons with disabilities, for careers in aerospace science and technology.
6. Offer authentic, hands-on student experiences in science and engineering disciplines—active participation by students in hands-on learning or practice with experiences rooted in NASA- related, STEM-focused questions and issues, and the incorporation of real-life problem-solving as the context for activities.
7. Engage middle school teachers in hands-on curriculum enhancement training through exposure to NASA scientific and technical expertise. Enhance the capability of teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines.
8. Provide summer opportunities on college campuses for secondary students, with the objective of increased enrollment in STEM disciplines or interest in STEM careers.
9. Develop new relationships with Community Colleges as well as sustain and strengthen existing institutional relationships with community colleges.
10. Encourage aeronautics research—research in traditional aeronautics disciplines and research areas appropriate to NASA's unique capabilities, and directly address the fundamental research needs of the Next Generation Air Transportation System (NextGen).
11. Support environmental Science and Global Climate Change—research and activities to better understand Earth's environments.
12. Diversify institutions, faculty, and student participants.
13. Enhance the capacity of institutions to support innovative research infrastructure activities that enable early career faculty to focus their research toward NASA priorities.

The OE has developed research questions that are largely supported by archival data are available for analysis. Other data will be needed and are to be determined by the Contractor through this Phase I task. The proposed questions are shared below.

i. Are Space Grant activities being carried out in compliance with Public Law 100-147 and in alignment with the priorities of NASA OE and NASA research and technology development?
ii. To what extent are funded activities engaging the intended populations (i.e., diverse students, faculty, and institutions) and meeting program goals as defined in the 2010 solicitation?
iii. To what extent do the methods of soliciting applications or requests, review of those requests, and awarding and distributing SG funds support the quality of the results?
iv. What effective practices exist in consortia partnerships among universities, federal, state, and local governments, and aerospace industries to encourage and facilitate the application of university resources to aerospace and related fields? To what extent do these practices ensure the quality of results?
v. What have been the SG's major contributions to NASA's education mission?
vi. Given the national investment in the SG program, what, if any, new approaches to the management of the SG program should NASA consider for the future?
vii. In all, what are the challenges, barriers, and constraints encountered in ensuring high-quality results?

(NASA OE, Scope of Work, pages 17-19)

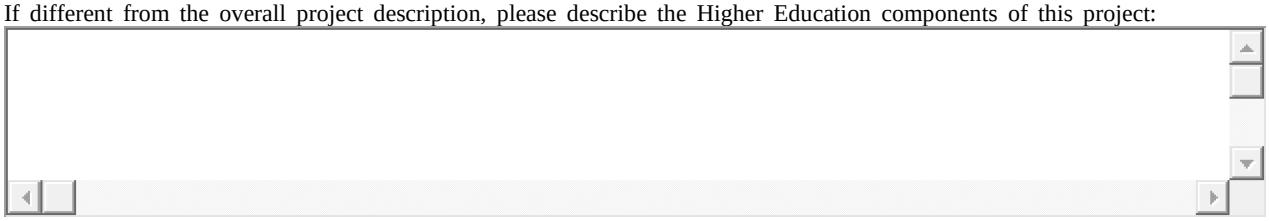
APPENDIX D: SELECTED OEPM FORMS

Higher Education

Project Title:

DESCRIPTION: (limit: 4000 characters)

If different from the overall project description, please describe the Higher Education components of this project:



4000 characters left

Please complete this form for accomplishments and activities implemented and/or completed during this fiscal year:

This project provides support for the following components: [Mark all that apply]:

Student/Student Teams

- ☐ On-Site University Research Experience
- ☐ On-Site NASA Center Experience
- ☐ On-Site Industry Experience
- ☐ Student-Led Flight project(s)
- ☐ Student-Led non-flight project(s)
- ☐ Travel (Visit a NASA Center, present a paper, attend a workshop, conference, symposium)

Educational Enhancement

- ☐ Seminar/Lecture/Symposium
- ☐ Competition sponsorship
- ☐ Design Project development
- ☐ Course Development (New or Revised)
- ☐ Pre-Service educator workshop

Other

- ☐ Other

Project Activity Date: Start: End:

What was the duration of your project activity:

- ○ Short Event(≤ 2 days)
- ○ Long Event (> 2 days)
- ○ Multi-Month (semester/quarter)
- ○ Year-long(12 months)

If the project activity was held in the US at a location other than a NASA center, please provide the city, state, & zip code of the location.

Activity Location City:

Activity Location State: Activity Location Zip Code:

If the project activity was held outside of the US please provide the country, city, and address

How many online STEM-based teaching tools were created and/or maintained as a result of this activity/project? Definition: An online STEM-based teaching tool is defined as a resource for K-12 and informal educators and higher education faculty that provides support to improve educators' STEM knowledge and/or enhances student interest and proficiency in STEM

Does this activity provide opportunities for students to participate in an existing NASA-sponsored project?

Yes No N/A

Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity(i.e. participants and or attendees that may have registered for the activity) indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated(i.e students that participate in revised courses that were developed via activity funds).

Participants	Direct Interaction	Indirect Interaction
Pre-Service Teachers	0	0
Higher Education Faculty	0	0
Undergraduate	0	0
Graduate	0	0
Post Doctoral	0	0
Community College	0	0
Total Participants	0	0

Please enter the number of direct participants that are unique to your activity/project. The unique participant fields are fields that indicate the actual number of individuals served. If an individual has been counted before in another activity they should not be doubled counted here

Participants	Unique Participants	Unique participants whose primary affiliation is with another project	Primary Project Affiliation
Pre-Service Teachers	0	0	
Higher Education Faculty	0	0	
Undergraduate	0	0	
Graduate	0	0	
Post Doctoral	0	0	
Community College	0	0	
Total Participants	0	0	

Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be a subset of the total Direct Student Participants recorded in the table above. Direct funded

student participants do not include recipients of reimbursements (i.e. travel, supplies, meals, etc..) 0

Direct Significant Investment: Please enter the total number of direct student participants who received a significant investment. (The total number of significant investment students is a subset of the total number of direct funded participants.) 0

A significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support. 160 or greater hours of direct contact, or some of other support considered "significant") For some projects the minimum level determining significant investment may be greater.

For all students who received direct funding and those who meet the criteria for significant engagement, please list the names of the students

Faculty/Researcher Participant Information:

Please enter the number of Faculty/Researcher participants

Faculty/researcher participants encompass faculty (tenure and non-tenure), researcher, participant, research assistant, staff

Please provide the number of faculty/researcher participants (If zero, enter 0)

New and Revised Courses:

If your project included higher education course development during the period of this report, please answer the following questions:

How many higher education course(s) have been developed using NASA-related content/support? (If zero, enter 0)

How many higher education courses have been revised using NASA-related content/support? (If zero, enter 0)

Informal Education

Project Activity Name:

Informal Education

DESCRIPTION: (limit: 4000 characters)

please describe the Informal Education components of this project:

4000 characters left

The project includes the following components [Mark all that apply]:

Informal Education Projects must contain at least two of the three components

- ☐ Supplemental Materials/Handouts
- ☐ Staffing
- ☐ Standard-based and/or learning objective content

Enter the number for each type of activity supported by this project:

Informal Educator Professional Development - Short Duration (< 2 days)

Informal Educator Professional Development - Long Duration (>= 2 days)

Exhibit Supported/Developed

Student Hands-on Activity

Public at large Activities Supported

Other

Project Activity Date: Start: End:

What was the duration of your project activity:

Short Event(≤ 2 days)

Long Event (> 2 days)

Multi-Month (semester/quarter)

Year-long(12 months)

If the project activity was held in the US at a location other than a NASA center, please provide the city, state, & zip code of the location.

Activity Location City:

Activity Location State: Activity Location Zip Code:

If the project activity was held outside of the US please provide the country, city, and address

How many online STEM-based teaching tools were created and/or maintained as a result of this activity/project? Definition: An online STEM-based teaching tool is defined as a resource for K-12 and informal educators and higher education faculty that provides support to improve educators' STEM knowledge and/or enhances student interest and proficiency in STEM

Does this activity provide opportunities for Informal Educators to participate in an existing NASA-sponsored project?

Yes No N/A

Does this activity provide opportunities for students to participate in an existing NASA-sponsored project?

Yes No N/A

Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity(i.e. participants and or attendees that may have registered for the activity) indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated(i.e students that participate in revised courses that were developed via activity funds).

Participants	Direct Interaction	Indirect Interaction
Elementary School Teachers	0	0
Middle School Teachers	0	0
High School Teachers	0	0
Pre-Service Teachers	0	0
Informal Educators	0	0

Higher Education Faculty	0	0
Elementary School Students	0	0
Middle School Students	0	0
High School Students	0	0
Undergraduate	0	0
Graduate	0	0
Post Doctoral	0	0
Administrators	0	0
Parents/Guardians	0	0
Public At Large	0	0
Other	0	0
Total Participants	0	0

Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be a subset of the total Direct Student Participants recorded in the table above. Direct funded student participants do not include recipients of reimbursements (i.e. travel, supplies, meals, etc..) 0

Direct Significant Investment: Please enter the total number of direct student participants who received a significant investment. (The total number of significant investment students is a subset of the total number of direct funded participants.) 0

A significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support. 160 or greater hours of direct contact, or some of other support considered "significant") For some projects the minimum level determining significant investment may be greater.

For all students who received direct funding and those who meet the criteria for significant engagement, please list the names of the students

Please describe the involvement of higher education students and faculty in the conduct of this element of the overall project: (limit: 500 characters)

Pre-college

Project Activity Name:

DESCRIPTION: (limit: 4000 characters)

overall project description

4000 characters left

Enter the number of events supported by this project:

Educator Professional Development

Student Engagement

Project Activity Date: Start: End:

What was the duration of your project activity:

- Short Event(≤ 2 days)
- Long Event (> 2 days)
- Multi-Month (semester/quarter)
- Year-long(12 months)

If the project activity was held in the US at a location other than a NASA center, please provide the city, state, & zip code of the location.

Activity Location City:

Activity Location State: Activity Location Zip Code:

If the project activity was held outside of the US please provide the country, city, and address

How many online STEM-based teaching tools were created and/or maintained as a result of this activity/project? Definition: An online STEM-based teaching tool is defined as a resource for K-12 and informal educators and higher education faculty that provides support to improve educators' STEM knowledge and/or enhances student interest and proficiency in STEM

How many interactive K-12 student activities were conducted?

Are evaluation mechanisms in place to demonstrate that teachers utilize the materials/knowledge in their classrooms?

- Yes
- No
- N/A

Please Explain: (limit: 500 characters)

Does this activity provide opportunities for Pre-college educators to participate in an existing NASA-sponsored project?

Yes No N/A

Student Participants:

Does this project contain pre-college student-based components?

Yes No

Does this activity provide opportunities for students to participate in an existing NASA-sponsored project?

Yes No N/A

Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity(i.e. participants and or attendees that may have registered for the activity) indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated(i.e students that participate in revised courses that were developed via activity funds).

Participants	Direct Interaction	Indirect Interaction
Elementary School Teachers	0	0
Middle School Teachers	0	0
High School Teachers	0	0
Pre-Service Teachers	0	0
Informal Educators	0	0
Higher Education Faculty	0	0
Elementary School Students	0	0
Middle School Students	0	0
High School Students	0	0
Undergraduate	0	0
Graduate	0	0
Post Doctoral	0	0
Administrators	0	0
Parents/Guardians	0	0
Public At Large	0	0
Other	0	0
Total Participants	0	0

Please enter the number of direct participants that are unique to your activity/project. The unique participant fields are fields that indicate the actual number of individuals served. If an individual has been counted before in another activity they should not be doubled counted here

Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be a subset of the total Direct Student Participants recorded in the table above. Direct funded student participants do not include recipients of reimbursements (i.e. travel, supplies, meals, etc..) 0

Direct Significant Investment: Please enter the total number of direct student participants who received a significant

investment. (The total number of significant investment students is a subset of the total number of direct funded participants.) 0

A significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support. 160 or greater hours of direct contact, or some of other support considered "significant") For some projects the minimum level determining significant investment may be greater.

For all students who received direct funding and those who meet the criteria for significant engagement, please list the names of the students

Please describe the involvement of higher education students and faculty in the conduct of this element of the overall project: (limit: 500 characters)

500 characters left

Please enter the number of any other activities supported by this project and provide a description:

Other

Research Infrastructure

Project Title:

DESCRIPTION: (limit: 4000 characters)

please describe the Research Infrastructure components of this activity:

4000 characters left

Please complete this form for accomplishments and activities implemented and/or completed during this fiscal year:

This activity provides support for the following components: [Mark all that apply]:

Student/Student Teams

- ☐ Faculty/Researcher/enhancement (mini-grants, release time for proposals, etc.)
- ☐ On-Site University research
- ☐ On-Site Industry Experience
- ☐ On-Site NASA Center Experience
- ☐ Travel (Visit a NASA Center, present a paper, attend a workshop, conference, symposium)
- ☐ Conducting of Conference/Workshop/Symposium

Educational Enhancement

☐ Partnership Collaboration Development

☐ Faculty recruitment

☐ Enhanced MSI competitiveness

☐ Contribute to University Research Experience

☐ Travel (Visit a NASA Center, present a paper, attend a workshop, symposium, conference)

Other

☐ Other

Project Activity Date: Start: End:

What was the duration of your project activity:

○ Short Event(≤ 2 days)

○ Long Event (> 2 days)

○ Multi-Month (semester/quarter)

○ Year-long(12 months)

If the project activity was held in the US at a location other than a NASA center, please provide the city, state, & zip code of the location.

Activity Location City:

Activity Location State: Activity Location Zip Code:

If the project activity was held outside of the US please provide the country, city, and address

How many online STEM-based teaching tools were created and/or maintained as a result of this activity/project? Definition: An online STEM-based teaching tool is defined as a resource for K-12 and informal educators and higher education faculty that provides support to improve educators' STEM knowledge and/or enhances student interest and proficiency in STEM

Does this activity provide opportunities for students to participate in an existing NASA-sponsored project?

○ Yes ○ No ○ N/A

Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity(i.e. participants and or attendees that may have registered for the activity) indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated(i.e students that participate in revised courses that were developed via activity funds).

Participants	Direct Interaction	Indirect Interaction
Pre-Service Teachers	0	0
Higher Education Faculty	0	0
Undergraduate	0	0

Graduate	0	0
Post Doctoral	0	0
Community College	0	0
Total Participants	0	0

Please enter the number of direct participants that are unique to your activity/project. The unique participant fields are fields that indicate the actual number of individuals served. If an individual has been counted before in another activity they should not be doubled counted here

Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be a subset of the total Direct Student Participants recorded in the table above. Direct funded student participants do not include recipients of reimbursements (i.e. travel, supplies, meals, etc..) 0

Direct Significant Investment: Please enter the total number of direct student participants who received a significant investment. (The total number of significant investment students is a subset of the total number of direct funded participants.) 0

A significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support. 160 or greater hours of direct contact, or some of other support considered "significant") For some projects the minimum level determining significant investment may be greater.

For all students who received direct funding and those who meet the criteria for significant engagement, please list the names of the students

Faculty/Researcher Participant Information:

Please provide the number of facility/researcher participants (If zero, enter 0)

Faculty/researcher participants encompass faculty (tenure and non-tenure), researcher, participant, research assistant, staff

APPENDIX E: EXAMPLE STATE-SPECIFIC FORMS

PARTICIPANT AUTHORIZATION

[redacted]

Authorization form

[redacted]

I recognize that I am an award recipient being supported with funds provided through the [redacted], a federally-funded program at the [redacted] acting as the fiscal agents for NASA Training Grant [redacted] I acknowledge that as part of their program, [redacted] has various reporting obligations to NASA regarding the program, including information about me as a recipient of said funding.

By signing this document, I hereby authorize representatives of the NASA [redacted] to contact me at any time in the future either through postal mail at my residential address or email address or telephone for the purpose of their reporting and disclosure requirements.

I further authorize [redacted] to provide NASA with my contact and demographic information (i.e., name, address, telephone number, email address, gender, ethnicity, race etc.), both now and in the future, to comply with reporting requirements for the National Space Grant College and Fellowship Program. I also confirm that I will provide [redacted] with my information promptly, truthfully, and completely to the best of my ability.

I authorize [redacted] to broadcast my appearance and/or voice and to record my picture and/or voice (on photographs, film and/or tape), to edit these recordings at its discretion, to incorporate these recordings into a broadcast medium, to use such recordings for publicity and advertising, and to use my name, photograph, likeness, voice, biographic and other information concerning me in connection with [redacted] programs and any reporting obligations related thereto. I agree and acknowledge that [redacted] owns all rights to the aforementioned recordings, photographs, and biographical materials. I fully release the NASA [redacted] from any loss, damage and liability arising out of my appearance on photographs, film, printed materials and/or tape.

Signed : _____ Dated : _____

PRINT AWARDEE NAME : _____

AWARDEE INSTITUTION : _____

LONGITUDINAL TRACKING

[redacted]

NASA [redacted]

LONGITUDINAL TRACKING AGREEMENT FORM

I, _____, *(writeyour full name), date of birth* _____ *(mm/dd/yyyy)* being a citizen of _____ *(country of citizenship)* hereby confirm that I will be receiving an award from the [redacted] for _____*(insert purpose of award OR project title and name of faculty advisor) .*

The following is my contact information :-

PRESENT EMAIL ADDRESS *(insert most frequently used email address)*

PERMANENT EMAIL ADDRESS *(University email addresses are not sufficient – this email address will be used for long term tracking)*

PRESENT MAILING ADDRESS (address where presently residing)

Phone No. :

PERMANENT MAILING ADDRESS (parent's residence address - this mailing address may be used to contact you for long term tracking)

Emergency Contact Phone No. :

Signed : _____ Dated : _____

AWARDEE QUESTIONNAIRE

Awardee /Applicant Information

(please print neatly)

Student First Name: (REQUIRED)

Student MI:

Student Last Name (REQUIRED):

Present University Email Address :

Permanent Email Address (yahoo, gmail etc.) :

Other Information

Level : (circle the correct level)

Undergraduate
(Freshman, Sophomore, Junior, Senior)

Graduate

Grade Point Average GPA: Format: X.XX (Example 3.75)

University / College Student is attending:

In which County is your University / school located [redacted]

In which Congressional district is your University / school located :

Current Student Address

Address:

City:

State: Zip Code :

Contact Phone : (FORMAT: XXX-XXX-XXXX)

Permanent Student Address

Address:

City:

State: Zip Code:

Student Demographics

Race : (circle all that apply)

American Indian or Alaska Native

Asian

Black or African American

Native Hawaiian or Other Pacific Islander

White

Ethnicity: (circle all that apply)

Hispanic or Latino

Not Hispanic or Latino

Gender : Female Male

Person with Disability : (Circle all that apply)

**** Students with disabilities are those who reported that they had one or more of the following conditions: ***a specific learning disability, a visual handicap, hard of hearing, deafness, a speech disability, an orthopedic handicap, or a health impairment***

I do not have a disability

I do not wish to identify my disability status

Hearing

Vision

Missing Extremities

Paralysis

Other Impairments

I have a disability, but it is not listed

Specify if not listed:

Military Experience

Have you served in the United States Military Service?

Yes *No*

Field of Study

Primary Discipline: *(ex. Physics, Chemistry, Engineering, etc)*

If applicable, Secondary Discipline:

Does student currently hold a degree? **YES** **NO**

Current Status: *(freshman, sophomore, junior, senior, Masters)*

Highest attained degree :(*High school, Associate, BS/BA, MS/MA, Ph.D)*

Student's Education Goal: *(Bachelors, Masters, PhD)*

Probable Field of Study for this Level?

Primary Discipline

If applicable, Secondary Discipline:

Career Goals

After completing studies, student plans to work in: (circle all that apply)

Higher Education	Faculty	Administrative
Non-NASA Federal Agency	Private Industry	NASA
Teaching (K-12)	Military	Consulting
Nonprofit Organization	Other	Undecided
State/Local Government		

SIGNED : _____ **DATE :** _____

PRINT NAME HERE : _____

APPENDIX F: SUB-ELEMENT SPECIFIC FORMS

Table 3: Information collected by the sub-element specific forms

Topic	Fellowship/ Scholarship	Research Infrastructure	Higher Education	Pre College	Informal Education
Program Description	Asked	Not asked (CORE)	Not asked (CORE)	Not asked (CORE)	Not asked (CORE)
Project Start End Date	Not asked	Not asked	Asked	Asked	Asked
Duration of Project (Short, Long, Multi-Month, A Year)	Not asked	Not asked	Asked	Asked	Asked
Location	Not asked	Not asked	Asked	Asked	Asked
Ongoing	Yes	Not asked (CORE)	Not asked (CORE)	Not asked (CORE)	Not asked (CORE)
Competitiveness	Yes	Not asked (CORE)	Not asked (CORE)	Not asked (CORE)	Not asked (CORE)
Name/Type Affiliates and Non-Affiliates Participating	Yes	Not asked (CORE Form)	Not asked (CORE)	Not asked (CORE Form)	Not asked (CORE Form)
Components	Onsite, University, NASA Center or Industry research experience, Faculty member	Not asked	Not asked	Not asked	Supplemental materials/handout, Staffing Standard-based and/or learning obj content
Student Team Types	Not asked	Faculty research enhancement, Onsite, University, NASA industry experience, Travel)	Onsite, university, NASA Center, Industry experience, Student led flight, non-flight project, travel) Educational Enhancement	Not asked	Not asked
Educational Enhancement Types	Not asked	Partnership development, Faculty recruitment, MSI competitiveness, University research experience, Travel	Seminar/ Lecture /Symposium, Competition Design project Preservice educator workshop	Not asked	Not asked

Topic	Fellowship/ Scholarship	Research Infrastructure	Higher Education	Pre College	Informal Education
Number of Activities Asked	Not asked	Not asked	Not asked	Educator professional development Student engagement Interactive K-12 activity Pre college based component and activities (sort and long duration)	Short and long duration informal education professional development Exhibit, Student hands on activity Public at large activity
Opportunity to Participate in NASA Project	Not asked	Asked (for students)	Asked (for students)	Asked (for pre-college educators)	Asked (for students and IE—possibly educator.)
Number of Direct Student Participants	Asked	Asked	Asked	Asked	Asked
Number of Unique Participants	Not asked	Asked	Asked	Asked	Asked
Number of Significant Investment	Asked	Not asked	Asked	Asked	Asked
Number of Faculty Researcher Participants, Institution Name	Not asked	Asked	Asked	Not asked	Not asked
Higher Ed Faculty Involvement	Not asked	Not asked	Not asked	Asked	Asked
Number of Online STEM Tool	Not asked	Asked	Asked	Asked	Asked
Number of Revised, New Course	Not asked	Not asked	Asked	Not asked	Not asked
Evaluation	Not asked	Not asked	Not asked	Asked	Not asked

APPENDIX G: VALIDITY, RELIABILITY AND USEFULNESS OF DATA

The remaining pages consist of a detailed listing of the results of the DQA across a list of data that are collected by Survey Monkey and the OEPM system. The team aligned question items that asked for the almost same information across the two data collection instruments. As detailed in the main body of the document, "low" on the reliability is earned when either validity was "low" or when data were valid but there was no consistency across Consortia.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
Consortium-level: Affiliates			
Affiliates **# by type**	1-5 (FY2010), 5 (FY2011) "For the next two questions, enter the data that reflect the current composition of your Consortium. Enter the number of each type of affiliate in your Consortium. Institution of Higher Education (Bachelor's and/or Graduate Degree Granting Institution of Higher Education (Community College/2-Year Institution): Government (Federal/State/Local) Industry: Museum/Science Center/Planetarium: Other Non-Profit Organization: Other:"	(Slide 12-15): Project Management>Affiliate Network "Name of institution or organization Name of Institution is automatically populated from Dept. of Ed list Type of Organization: o Government o Industry o Museum/Science Center/Planetarium o Other Non-Profit o Other Is this the lead institution? Yes/No/Not Applicable"	As explained by report by NASA Ed staff, Consortia define "affiliates" differently. APD report lists all affiliates name. If the evaluation focus on the nature of affiliates, their strategies, and the role of advisory board, although the APD Report provides some information, because it is an open ended question, the evaluator will need to talk with each consortium. As for "affiliate participating," see project activity forms o Validity at Consortium-level: **High because each affiliate is listed. However, the meaning of affiliate might have changed, and this may not be documented.** o Reliability across Consortia : Low
Affiliates **# of academic affiliates by types higher education institutions**	1-6 (FY2010), 6(FY2011) "For the institutions of higher education, enter the number of academic affiliates in your Consortium that currently meet the following classifications; enter a zero for classifications that are not applicable to any of your Consortium members. For a list of the postsecondary minority institutions, please refer to the following website (you will need to cut and paste the url into your browser using a new tab): http://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html HSI - Hispanic Serving Institution HBCU - Historically Black College or University OMU - Other Minority University TCU - Tribal College or University Institution Serving Primarily Women Academic Institution for Persons with Disabilities"	(Slide 12-15): Project Management>Affiliate Network **"Name of institution or organization** **Name of Institution is automatically populated from Dept. of Ed list and includes MSI** Type of Organization: o Government o Industry o Museum/Science Center/Planetarium o Other Non-Profit o Other Is this the lead institution? Yes/No/Not Applicable "	Interview with NASA OE Staff (Phase1), we learned there is no good way to identify institution serving primary women, and academic institution for persons with disabilities. Department of Education's MSI page does not list institutions serving primarily women. o **Validity at Consortium-level: High (for MSIs listed in Dept. of Ed)** o Reliability across Consortia: High Reason: affiliates' names are listed in APD and OEPM, definitions of HIS, HBCU OMU and TCU are consistent across Consortia because the definitions are found in Higher Education Opportunity Act and related codes, and NCES can generate the list.
Mission Vision		Base Pre Management Form (Slide 24) "Mission and Vision Provide the mission and vision" (String)	NASA OE Staff thinks Consortia type in what it wrote in APD (and proposal). Narrative.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
Goals Smart Objectives		Base Pre Management Form (Slide 24) "Goals and Smart Objectives Please employ the SMART methodology for defining objectives. Management: Operational Goals and Objectives List your Management/Operational Goals and Objectives (overall goals for the Consortium)" (String)	Narrative.
Goals Objectives		Base Pre Management Form (Slide 24) Programmatic Goals and Objectives List your Programmatic Goals and Objectives for each program area organized by NASA OE outcomes Outcome1: Employ and Educate Outcome 2: Educate and Engage Outcome 3: Engage and Inspire." (Note: Consortia is to select outcomes and enter narrative) (String)	Narrative.
NASA Performance Measures		Slide 25 Project Contributions to Annual Performance Goals. FY2012: PART Measures were asked: (Note: NASA OE talked about Annual Performance Goals (APGs) See NASA Response to Slide 25 question)	Each Consortium can select which additional PART measures to report. It is not clear how this information is used by NASA OE.
Management Advisory Committees		Pre Management Form: Advisory Committee Slide 26 ADMINISTRATION: "Will the Consortium take advantage of an advisory committee? Yes/No Please provide the number of advisory committees or groups (numerical) If Yes, please provide names of advisory committees or groups below and brief description, including Composition Meeting Frequency Committee role in operations and decision making Describe the strategy and Procedure for adding and removing members of the Consortium" (String)	Narrative.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
Budget		BasePre Management Form Proposed Budget/Expenditure (Slide 27-28) "NASA budget Non-Federal Matching Funds Cash/Other by the following types Lead Institution Academic Affiliates State/Local Government Industry Non Profit Organizations Other (Describe) Explanation of Carry Over Funds Proposed Expenditure NASA, Non-Federal by Direct Labor Estimated Travel Supplies/Services (describe) Other Direct Costs Indirect Costs Fellowship/Scholarship Summary of Proposed Expenditures by Program NASA, Non-Federal by Research Infrastructure Higher Education Pre College Informal Education Consortium Admin Costs Indirect Costs Fellowship/Scholarship"	We did not review the validity of numbers reported. Reliability across Consortia is low because, as described in "sub-element" section, each consortium decides what activities and what portion of each project activity should be marked to a certain sub element. It is not clear if there is any documentation about what each sub element entails for each consortium and guidance.
Fellowship/Scholarship (F/S)			
Activity Name	2-1 (FY2010), 7(FY2011) "Please provide data attributable to your FY2010 Fellowship/Scholarship projects in the fields below. "Project" is defined as an opportunity or entity that a student would apply for; it is not the number of individual fellowship/scholarship student projects. For example, if you have a statewide Undergraduate Scholarship opportunity to which students apply, this would count as "1" project Total Number of Fellowship/Scholarship Projects:"	Activity Management> **Fellowship/Scholarship Forms** (Slide 76) Section A "Project Activity Name Project Description A short (paragraph or so) description of the project, its goals and objectives, and unique characteristics. This section should include special conditions and products to be completed by participant"	FY 2010-2011 (Survey Monkey) Validity: Low Reliability: Low FY 2012-2013 (OEPM) Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
F/S Description	2-2 (FY2010), 8(FY2011) "Please provide a brief description of the general nature and types of projects supported by the Consortium investment in Fellowship/Scholarship opportunities for students Open ended"	Activity Management> **Fellowship/Scholarship Forms** (Slide 76) Section A "Project Description A short (paragraph or so) description of the project, its goals and objectives, and unique characteristics. This section should include special conditions and products to be completed by participant"	Narrative
F/S If Ongoing Activity		Activity Management> Fellowship/Scholarship Forms (Slide 76) Section A "Is this an ongoing project? Yes No"	Validity: Varies by Consortia because the performance period reported and the way data were collected vary. Evaluators will need to confirm with Consortia, Reliability across Consortia: Low
F/S Competitiveness		Activity Management> Fellowship/Scholarship Forms (Slide 76) Section A "Competitiveness. Describes how Fellowship and Scholarships (F/S) are competitively awarded. Include discussion of recurrent of applicant, selection of awardees and participation of all Consortium academic affiliates."	Narrative
F/S Participating affiliate		Activity Management> Fellowship/Scholarship Forms (Slide 77) Section B "Select Eligible Participating Affiliates Please provide the names of the affiliate that participated within this project	Validity: Varies by Consortia, depending on how data are collected. Evaluators will need to learn from Consortium how they decided to list organizations as participating affiliates. Reliability: Low
F/S Participating affiliate		Activity Management> Fellowship/Scholarship Forms (Slide 77) Section B "Select Eligible Participating Affiliates Please provide the names of the non-affiliate that participated within this project"	Validity: Varies by Consortia, depending on how data are collected. Evaluators will need to learn from Consortium how they decided to list organizations as participating affiliates. Reliability: Low
F/S if project provides the support		Activity Management> Fellowship/Scholarship Forms (Slide 78) Section C "This project provides support for the following (Mark all apply) Onsite university research or design experience Onsite NASA Center Experience Onsite Industry Experience University based research or design experience Faculty mentor Other (Specify)"	We did not ask Consortia how they collected this data. However, based on responses to our question of how Consortium collected data for OEPM, we think validity of the data varies by Consortia. We did not find data definition by NASA on the OEPM system. Evaluators will need to ask definitions of each types of support.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
F/S # of Direct Participants		Activity Management> Fellowship/Scholarship Forms (Slide 80) Section C "Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity (i.e. participants and or attendees that may have registered for the activity). Indirect participants are individuals that indirectly benefit from ANSA activity and /or ca only be estimated (i.e., students that participate in revised courses that we developed via activity funds) Direct Interaction Number (by the following types) Pre Service Teachers Higher Education Faculty Undergraduate Graduate Post-Doctoral Community College"	Validity: varies by Consortia, depending on how data are collected. **Potential high** However, **every recipients' information is to be in Award Profile, and with financial record, the evaluators will be able to find out validity to some extent.** Reliability across Consortia: low because reporting period varies.
F/S # of Indirect Participants		Activity Management> Fellowship/Scholarship Forms (Slide 80) Section C "Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity (i.e. participants and or attendees that may have registered for the activity). Indirect participants are individuals that indirectly benefit from ANSA activity and /or ca only be estimated (i.e., students that participate in revised courses that we developed via activity funds) Indirect Interaction Number (by the following types) Pre Service Teachers Higher Education Faculty Undergraduate Graduate Post-Doctoral Community College"	Validity: Low Reliability Across Consortia: low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
F/S # of Unique Direct Participants, Affiliation		Activity Management> Fellowship/Scholarship Forms (Slide 81) Section D "Please enter the number of direct participants that are unique to your activity/project. The unique participant fields are fields that indicate the actual number of individuals served. If an individual has been counted before in another activity they should not be double counted here. The number of Unique Participants, Unique participants whose primary affiliation is with another project and project name (by the following participant types) Pre Service Teachers Higher Education Faculty Undergraduate Graduate Post-Doctoral Community College	Validity: As for affiliation, the validity of information varies by Consortia, depending on how data are collected. Evaluators will need to check the validity for Consortia selected for evaluation. As for the number of unique direct participants, **potentially high**, by cross referencing information in Award Profile. Reliability across Consortia: low
F/S # of Direct Participants received Monetary Support		Activity Management> Fellowship/Scholarship Forms (Slide 81) Section D "Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be a subset of the total Direct Student Participants recorded in the table above. Direct funded student participants do not include recipients of reimbursements (i.e., travel, supplies, meals, etc.)"	Validity: **Potentially high** by cross referencing information in Award Profile. Every recipients' information is to be in Award Profile, and with financial record, the evaluators will be able to find out validity to some extent. Reliability across Consortia: low because reporting period varies. ***NOTE: It is not clear why this question is asked because all fellowship/scholarship marked activity participants should have received monetary award.***
F/S # of Significant Investment		Activity Management> Fellowship/Scholarship Forms (Slide 81) Section D "Direct Significant Investment: please enter the total number of direct student participants who received significant investment. The number of significant investment students is a subset of the total number of direct funded participants."	Validity: **Potentially high by comparing information in Award Profile**. Validity of the number reported to this specific question varies by Consortia, depending on how data are collected. Every recipients' information is to be in Award Profile, and with financial record, the evaluators will be able to find out validity to some extent. Reliability across Consortia: low because reporting period varies and definition of significant investment varied by Consortia.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
F/S Explanation of the change of award from previous year	2-3 (FY2010), 9(FY2011) "Comparison of FY2009 to FY2010 Student Data Tables: In terms of the Fellowship/Scholarship awards, provide a brief explanation for variances of a significant nature between the two reporting periods, in terms of the number and/or demographics of awardees. If there are no significant variances, please provide a brief statement indicating that a comparison was completed Open ended"		Narrative
F/S Student Information		Student Award (Slide 88-) "First Middle Last Gender, Female, Male, Undisclosed Race: (American Indian or Alaska Native, Black of African American, Asian, Native Hawaiian Pacific Islander, White, Some Other Race, Do Not Wish to Provide) Ethnicity (Hispanic or Latino, Non-Hispanic or Not Latino Do Not Wish to Report) Disability (Hearing impairment Visual impairment, Morbidity/Orthopedic impairment, Mental Impairment Do not wish to provide, Other Specify Citizenship (Us Citizen, Non US citizen) Date of Birth Current Address, Permanent Address, E-mail, Phone Employment Status (Employed with NASA/JPL Employed with an Aerospace Contractor Employed in STEM field (nonacademic filed) Employed in K [12 STEM academic field Employed in other STEM academic field Other (e.g. non-STEM employment, non-STEM academic) Award Category (Travel Award, Faculty Projects, Fellowship, Internship, Scholarship, Research Infrastructure, Higher Education, Pre Service Teacher Projects, In Service Teacher Projects) Award Type, (Award amount, Funding-Fellowship; Scholarship, Research infrastructure, Higher Education) Award Period START MM, YYYY, END MM YYYY Engagement Period Start MM YYYY End MM YYYY Enrolled Institution, Enrolled Major, Enrolled Degree level Occupational Grouping Anticipated graduation ate MM YYYY Participant engaged in Research, Yes No Center Check if award involves other (not center) or additional affiliates	Validity: **Varies** by Consortia depending on how data are collected and **by data elements.** (Please see Award profile section of Phase II report). **As for the information about awardees themselves, since the data are collected from students (either students filling out the application), validity is high, except for some questions (disability, citizenship) that students may not want to report as they know that someone will be entering data to OEPM system.** The potential problem is there may be students who did not filled out (as reported by Consortia interviews). Reliability across Consortia: some data elements, such as award and engagement start and end date, are low because Consortia had different interpretation. Race, ethnicity, disability, institution information are reliable.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
		Industry/Contractor (company Name Institution of higher Education (Specify) Mentor information (Mentor's first, last name, e-mail, phone)"	
Research Infrastructure (RI)			
RI # of projects	3-1 (FY2010) 10(FY2011) "Please provide the following in terms of the aggregate of all Research Infrastructure Projects. "Project" is defined as an opportunity or entity to which a student or faculty member would apply; it is not the number of individual student or faculty projects. Total number of projects:	Project Management>Activity Data Slide 40 CORE DATA "Project Activity Name"	FY2010-2011 Survey Monkey Validity: Low, because we do not know what projects are counted in this category. Reliability: Low because Consortia had different definition and the way of counting. FY2012-13 OEPM Validity: **High, because OEPM lists all activity name. However, some affiliates lead may not know why a particular activity was marked as Research Infrastructure.** (See Phase II report) Reliability: low, because Consortia assigned sub element differently.
RI: # of affiliates involved	3-1 (FY2010), 10(FY2011) "Total number of affiliates involved in projects."	Project Management>Activity Data (Slide 41) CORE DATA "Select Participating Affiliates Please provide the names of the affiliates that participated within this activity"	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Lead institutions may not know why a certain affiliate is listed as participated as it is reported by affiliate that ran the project activity. Reliability across Consortia: Low
RI # of non-Affiliate organizations involved	3-1-(FY2010), 10(FY2011) Total number of non-affiliate organizations involved in projects	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Enter name of non-Affiliate Organization(s) if applicable	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Lead institutions may not know why a certain affiliate is listed as participated as it is reported by affiliate that ran the project activity. Reliability across Consortia: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
RI Name of affiliates participated	3-2 (FY2010), 11(FY2011) Please list the affiliate members of your Consortium that participated in Research Infrastructure projects supported by FY2010 funds (separate institution names with a comma) Open-Ended Response	Project Management>Activity Data Slide 41 CORE DATA "Select Participating Affiliates Please provide the names of the affiliates that participated within this activity	FY2010-2011 Survey Monkey Validity: Low Lead institutions may not know why a certain affiliate is listed as participated as it is reported by affiliate that ran the project activity. Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia Lead institutions may not know why a certain affiliate is listed as participated as it is reported by affiliate that ran the project activity. Reliability across Consortia: Low
RI Name of non-affiliates organizations participated	3-3 (FY2010), 12(FY2011) "If applicable, please provide the name of any non-affiliate organizations that participated in Research Infrastructure projects supported by FY2010 funds (separate institution names with a comma) Open-Ended Response"	Project Management>Activity Data Slide 41 CORE DATA "Select Participating Affiliates Enter name of non-Affiliate Organization(s) if applicable"	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia. Lead institutions may not know why a certain affiliate is listed as participated as it is reported by affiliate that ran the project activity. Reliability across Consortia: Low because Consortia used different data definition of "participating")
Description of RI Projects	3-4 (FY2010), 13(FY2011) Please provide a brief description of the general nature and types of projects supported in Research Infrastructure. Open-Ended Response	Project Management>Activity Data Slide 40 CORE DATA "Activity Description: Please provide a short (a paragraph or so) description of the activity, its goals and objectives and unique characteristics. This section should include special contributions and products to be completed by participants." (String)	Narrative
RI Ongoing activity		Project Management>Activity Data (Slide 40) CORE DATA "Is this an ongoing activity? Yes No"	Validity: Varies by Consortia because the performance period reported and the way data were collected vary. Evaluators will need to confirm with Consortia. Reliability across Consortia: Low
RI Competitiveness		Project Management>Activity Data (Slide 40) CORE DATA "Competitiveness Describe the competitiveness of this activity including eligibility and selection criteria" (String)	Narrative Evaluators may be able to review and summarize the partnership activities described.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
RI NASA Connections		Project Management>Activity Data (Slide 41) CORE DATA "NASA Connections This activity is in alignment with the priorities of the following connections (Mark all that apply) Aeronautics Research Mission Directorate Human Exploration & Operations (HEOP Office of Chief Technologist Science Mission Directorate OE Other (Specify) None of the above"	We did not ask specific question on this data element, however, based on the way Consortia collect data, Validity: Varies by Consortia because data collection process varied by Consortia. Reliability across Consortia: low
RI Partnership		Project Management>Activity Data (Slide 41) CORE DATA "A Partnership is a reciprocal and voluntary relationship between the activity personnel and NASA, industry, or other partners to cooperatively achieve the goals of the activity. Was there a partnership with a NASA center on this activity? Yes Institution Name (string) NASA Centers Description of partnership (String)"	Narrative Evaluators may be able to review and summarize the partnership activities described.
RI Support components of Student/Student Teams		Project Management>Activity Research Infrastructure Form (Slide 73) Section A "Please complete this form for accomplishments and activities implemented and/or completed during this fiscal year This project provides support for the following components (mark all that apply) Student/Student Teams Faculty/Research/ Enhancement (mini grants, release time for proposals) Onsite University Research Experience Onsite NASA Center Experience Onsite Industry Experience Travel (Visit a NASA Center, present a paper, attend a workshop, conference symposium) Conducting of Conference/Workshop/Symposium	We did not ask specific question on this data element, however, based on the way Consortia collect data, Validity: Varies by Consortia because data collection process varied by Consortia. Reliability across Consortia: low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
RI If Support components of Educational Enhancement		Project Management>Activity Research Infrastructure Form (Slide 73) Section A "Please complete this form for accomplishments and activities implemented and/or completed during this fiscal year This project provides support for the following components (mark all that apply) Educational Enhancement Partnership Collaboration Development Faculty Recruitment Enhance MSI competitiveness Contribute to University Research Experience Travel (visit a NASA center, present a paper, attend workshop, symposium conference)"	We did not ask specific question on this data element, however, based on the way Consortia collect data, Validity: Varies by Consortia because data collection process varied by Consortia. Reliability across Consortia: low
RI Support components, Other		Project Management>Activity Research Infrastructure Form (Slide 73) Section A "Please complete this form for accomplishments and activities implemented and/or completed during this fiscal year. This project provides support for the following components (mark all that apply) Other Describe" (String)	Narrative
RI # and Description of online STEM based teaching tools created		Project Management>Activity Research Infrastructure Form (Slide 74) Section B "How many online STEM based teaching tools were created and /or maintained as a result of this activity/project? Definition: an online STEM-based teaching tool is defined as a resource for K-12 and informal educators and higher education faculty that provides support to improve educators; STEM knowledge and/or enhances student interest and proficiency in STEM #, Description, Category Type New, Existing"	Validity: Varies by Consortia because data collection process varied by Consortia. Reliability across Consortia: low Evaluator will be able to confirm with Consortia or PIs because the courses are listed. Once validation of the courses is done by the evaluator, and once the definition of "as result of this project" is standardized, validity and reliability will be potentially high.
RI Opportunities for student to participate NASA project		Project Management>Activity Research Infrastructure Form (Slide 74) Section B "Does this activity provide opportunities for students to participate in an existing NASA sponsored. Yes, No, NA List project	We did not ask a question on this particular data element. Based on the response on the process of data collection, Validity: Varies by Consortia because the way data are collected varied by Consortia. Reliability: low The evaluator will need to confirm with Consortia based on the list of project provided to map out what "an activity providing opportunities for students to participate in existing NASA sponsored project" means.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
RI # of Direct Participants		Project Management>Activity Research Infrastructure Form (Slide 74) Section B "Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity (i.e. participants and or attendees that may have registered for the activity). Indirect participants are individuals that indirectly benefit from ANSA activity and /or ca only be estimated (i.e., students that participate in revised courses that we developed via activity funds) Direct Interaction Number by the following types Pre Service Teachers Higher Education Faculty Undergraduate Graduate Post-Doctoral Community College"	Validity: varies by Consortia. As Phase II findings show some Consortia relied on affiliates' report, and although all 5 Consortia agreed that they defined participate as actually attending the event/workshop, and some talked about affiliates or PIs using sign in sheet, they rarely validated the number, and at least one consortium reported sometimes PIs or affiliates had challenge of getting consistent data. Reliability across Consortia: Low
RI # of Indirect Participants		Project Management>Activity Research Infrastructure Form (Slide 74) Section B "Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity (i.e. participants and or attendees that may have registered for the activity). Indirect participants are individuals that indirectly benefit from ANSA activity and /or ca only be estimated (i.e., students that participate in revised courses that we developed via activity funds) Indirect Interaction Number by the following types Pre Service Teachers Higher Education Faculty Undergraduate Graduate Post-Doctoral Community College"	Validity: low Reliability across Consortia: low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
RI **# of Unique direct participants and whose primary affiliation is with other project**		Project Management>Activity Research Infrastructure Form (Slide 75) Section C "Please enter the number of direct participants that are unique to your activity/project. The unique participant fields are fields that indicate the actual number of individuals served. If an individual has been counted before in another activity they should not be double counted here. The number of Unique Participants, Unique participants whose primary affiliation is with another project and project name by the following participant types Pre Service Teachers Higher Education Faculty Undergraduate Graduate Post-Doctoral Community College "	We did not ask a question, how Consortia collect and validate the number of unique direct participants and their primary affiliation. Based on responses to a question on the process of data collection. Validity: varies by Consortia. As Phase II findings show some Consortia relied on affiliates' report, and although all 5 Consortia agreed that they defined participate as actually attending the event/workshop, and some talked about affiliates or PIs using sign in sheet, they rarely validated the number, and at least one consortium reported sometimes PIs or affiliates had challenge of getting consistent data. Reliability across Consortia: Low
RI **# of Direct Participant who are Funded students**		Project Management>Activity Research Infrastructure Form (Slide 75) "Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be a subset of the total Direct Student Participants recorded in the table above. Direct funded student participants do not include recipients of reimbursements (i.e., travel, supplies, meals, et)"	This number may or may not be cross-referenced and validated by using Award Profile data. **If Award Profile collects all funded students regardless the amount, the evaluators can validate the numbers, so validity will be potentially high.** If Award Profile does not collect all funded students' information, the validity of this data varies by Consortia.
RI **# of Significant Investment**		Project Management>Activity Research Infrastructure Form (Slide 75) Direct Significant Investment: please enter the total number of direct student participants who received significant investment. The number of significant investment students is a subset of the total number of direct funded participants.	Note: according to NASA OE Staff, this sentence was later changed. (NOTE; OEPM is saying to enter all students who received monetary funds and students with significant investment should be in Student Award form.) Validity: Low (different definition of significant investment used by Consortia). Evaluator will need to find documentation on how Consortia defined significant investment. Award provide may be used for cross-check of the number. Reliability: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
RI # of non- student direct participants by gender and by faculty or non-faculty	3-5 (FY2010), 14(FY2011) "Please provide the following data as it pertains to the gender of the faculty and other non-student participants in your Research Infrastructure Projects. Your response should include non-student Direct Participants. Recall that all student participants are to be reported in the FY2010 Student Data Tables. If the number is zero, please enter 0 Faculty - Male: Faculty - Female: (FY2010) Non-Faculty – Male (FY2010), (FY2011) Other Participants – Male (Non-Faculty and participants not included in FY2011 Student Data Tables) (FY2010) Non-Faculty – Female (FY2010) (FY2011) Other Participants – Male(Non-Faculty and participants not included in FY2011 Student Data Tables)"	Project Management>Activity Research Infrastructure Form (Slide 76) Section D "Faculty/Researcher Participant Information Please enter the number of faculty/Researcher participants by institution type Faculty Researcher participants encompass faculty (tenure and non-tenure) researcher, participant, research assistant, staff. Please provide the number of faculty searcher participant (if zero, enter 0) Name" (string) "Institution Name and Department" (string)	FY2010-11 Validity: Low as described in the report in Phase I, a definition of different types of participants varied Reliability: Low FY2012-13 We did not ask a specific question about how Consortia collects and validate the number of faculty/researcher by institution type. Based on responses to a question of data collection process, Validity: Varies by Consortia. Some Consortia rely on affiliates' report of who participated, but other Consortia could talk directly with PI. Reliability across Consortia: Low
RI description of "Other Participants"	3-6 (FY2010), 15(FY2011) Provide a description of "Other Participants" if applicable Open –ended response		Narrative
RI # of Non-Student Direct Participant by Minority Status	3-7 (FY2010), 16(FY2011) Please provide the following data as it pertains to the non-student Underrepresented Minority Participants in your Research Infrastructure Projects. Your response should include non-student Direct Participants. Recall that all student participants are to be reported in the FY2010 Student Data Tables. These data are a subset of the data collected in Question 5. If the number is zero, please enter 0. Faculty - Underrepresented Male Faculty - Underrepresented Female Other Participants - Underrepresented Male (Non-Faculty and participants not included in FY2010/FY2011 Student Data Tables) Other Participants - Underrepresented Female (Non-Faculty and participants not included in FY2010/FY2011 Student Data Tables)		During Phase I, we discussed a definition of non-student participants varied by Consortia. Validity: low Reliability across Consortia: low
RI Description of other participants	3-8 (FY2010), 17(FY2011) Provide a description of "Other Participants" if applicable Open-Ended Response		Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
RI **# of all students, faculty and other participants with disability by gender**	3-9 (FY2010), 18(FY2011) Please provide data regarding any Research Infrastructure participants with physical disabilities. Please include all STUDENT, FACULTY and OTHER participants (to avoid double counting, these data will not be aggregated with FY2010 Student Data Tables). Male Person(s) with Disabilities Female Person(s) with Disabilities:		This data element was not asked in the interview with Consortia. During Phase I, from the interview with NASA OE Staff, we learned there is no standardized definition of persons with disability. Validity: Low Reliability across Consortia: Low
Higher Education (HE)			
HE **# of projects**	4-1 (FY 2010), 19(FY2011) Please provide the following in terms of the aggregate of all Higher Education Projects. "Project" is defined as an opportunity or entity to which a student or faculty member would apply; it is not the number of individual student or faculty projects. Total number of projects:	Project Management>Activity Data Slide 40 CORE DATA Project Activity Name	FY2010-2011 Survey Monkey Validity: Low, because we do not know what projects are counted in this category. Reliability: Low because Consortia had different definition and the way of counting. FY2012-13 OEPM Validity: **High, because OEPM lists all activity name.** However, some affiliates lead may not know why a particular activity was marked as Research Infrastructure. (See Phase II report) Reliability: low, because Consortia assigned sub element differently.
HE **# of affiliates involved**	4-1 (FY2010), 19(FY2011) Total number of affiliates involved in projects	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Please provide the names of the affiliates that participated within this activity	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low
HI **# of non-affiliate organizations involved**	4-1 (FY2010), 19(FY2011) Total number of non-affiliate organizations involved in projects	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Enter name of non-Affiliate Organization(s) if applicable	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low
HE: **Name of affiliates participated**	4-2 (FY 2010), 20(FY2011) Please list the affiliate members of your Consortium that participated in Higher Education projects supported by FY2010 funds (separate institution names with a comma) Open-Ended Response	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Please provide the names of the affiliates that participated within this activity	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE: Name of non-affiliate organizations participated	4-3 (FY2010), 21(FY2011) If applicable, please provide the name of any non-affiliate organizations that participated in Higher Education projects supported by FY2010 funds (separate institution names with a comma): Open-Ended Response	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Enter name of non-Affiliate Organization(s) if applicable	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low
HE Description of projects	4-4 (FY2010), 22(FY2011) "Please provide a brief description of the general nature and types of projects supported in Higher Education Open-Ended Response"	Project Management>Activity Data Slide 40 CORE DATA "Activity Description: Please provide a short (a paragraph or so) description of the activity, its goals and objectives and unique characteristics. This section should include special contributions and products to be completed by participants."	Narrative
HE If the activity is ongoing activity		Project Management>Activity Data Slide 40 CORE DATA Is this an ongoing activity? Yes No	Validity: Varies by Consortia because the performance period reported and the way data were collected vary. Evaluators will need to confirm with Consortia. Reliability across Consortia: Low
HE Competitiveness		Project Management>Activity Data Slide 40 CORE DATA "Competitiveness Describe the competitiveness of this activity including eligibility and selection criteria"	Narrative
HE: NASA Connections		Project Management>Activity Data (Slide 41) CORE DATA "NASA Connections This activity is in alignment with the priorities of the following connections (Mark all that apply) Aeronautics Research Mission Directorate Human Exploration & Operations (HEOP Office of Chief Technologist Science Mission Directorate OE Other (Specify) None of the above	We did not ask specific question on this data element, however, based on the way Consortia collect data, Validity: Varies by Consortia because data collection process varied by Consortia. Reliability across Consortia: low
HE Partnership institutions, NASA Centers, and Description		Project Management>Activity Data Slide 41 CORE DATA A Partnership is a reciprocal and voluntary relationship between the activity personnel and NASA, industry, or other partners to cooperatively achieve the goals of the activity. Was there a partnership with a NASA center on this activity? Yes, Institution Name" (string) "NASA Centers Description of partnership" (String)	Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE Support components of Student/Student Teams the project activity		Project Management>Activity Data Higher Education Form (Slide 58) Section A Please complete this form for accomplishments and activities implemented and/or completed during this fiscal year This project provides support for the following components (mark all that apply) Student/Student Teams Onsite University Research Experience Onsite NASA Center Experience Onsite Industry Experience Student Led Flight Projects Student Led Non-Flight Projects Travel (Visit a NASA Center, present a paper, attend a workshop, conference symposium)	We did not ask a question on this particular data element. Based on the response on the process of data collection, Validity: Varies by Consortia because the way data recollected varied by Consortia. Reliability: low Evaluator will need to confirm data definitions used by Consortia.
HE If Support components of Educational Enhancement he project activity		Project Management>Activity Data Higher Education Form (Slide 58) Section A "Please complete this form for accomplishments and activities implemented and/or completed during this fiscal year This project provides support for the following components (mark all that apply) Educational Enhancement Seminar/Lectures/Symposium Competition sponsorship Design Project development Course development (new or revised) Pre service educator workshop"	We did not ask a question on this particular data element. Based on the response on the process of data collection, Validity: Varies by Consortia because the way data recollected varied by Consortia. Reliability: low Evaluator will need to confirm data definitions used by Consortia.
HE If Support components, Other project activity		Project Management>Activity Data Higher Education Form (Slide 58) Section A "Please complete this form for accomplishments and activities implemented and/or completed during this fiscal year This project provides support for the following components (mark all that apply) Other Describe" (String)	Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE # of Direct Participants		Project Management>Activity Data Higher Education Form (Slide 60) Section C "Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity (i.e. participants and or attendees that may have registered for the activity). Indirect participants are individuals that indirectly benefit from ANSA activity and /or ca only be estimated (i.e., students that participate in revised courses that we developed via activity funds) Direct Interaction Number by the following types Pre Service Teachers Higher Education Faculty Undergraduate Graduate Post-Doctoral Community College"	Validity: varies by Consortia. As Phase II findings show some Consortia relied on affiliates' report, and although all 5 Consortia agreed that they defined participate as actually attending the event/workshop, and some talked about affiliates or PIs using sign in sheet, they rarely validated the number, and at least one consortium reported sometimes PIs or affiliates had challenge of getting consistent data. Reliability across Consortia: Low
HE # of Indirect Participants		Project Management>Activity Data Higher Education Form (Slide 60) Section C Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity (i.e. participants and or attendees that may have registered for the activity). Indirect participants are individuals that indirectly benefit from ANSA activity and /or ca only be estimated (i.e., students that participate in revised courses that we developed via activity funds) Indirect Interaction Number by the following types Pre Service Teachers Higher Education Faculty Undergraduate Graduate Post-Doctoral Community College	Validity: varies by Consortia, but in general, low Reliability across Consortia: low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE **# of Unique direct participants and whose primary affiliation is with other project**		Project Management>Activity Data Higher Education Form (Slide 61) Section D "Please enter the number of direct participants that are unique to your activity/project. The unique participant fields are fields that indicate the actual number of individuals served. If an individual has been counted before in another activity they should not be double counted here. The number of Unique Participants, Unique participants whose primary affiliation is with another project and project name by the following participant types Pre Service Teachers Higher Education Faculty Undergraduate Graduate Post-Doctoral Community College"	We did not ask a question, how Consortia collect and validate the number of unique direct participants and their primary affiliation. Based on responses to a question on the process of data collection. Validity: varies by Consortia. As Phase II findings show some Consortia relied on affiliates' report, and although all 5 Consortia agreed that they defined participate as actually attending the event/workshop, and some talked about affiliates or PIs using sign in sheet, they rarely validated the number, and at least one consortium reported sometimes PIs or affiliates had challenge of getting consistent data. Reliability across Consortia: Low"
HE **# of Direct Participant who are Funded students**		Project Management>Activity Data Higher Education Form (Slide 61) Section D "Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be a subset of the total Direct Student Participants recorded in the table above. Direct funded student participants do not include recipients of reimbursements (i.e., travel, supplies, meals, et)"	This number may or may not be cross-referenced and validated by using Award Profile data. **If Award Profile collects all funded students regardless the amount, the evaluators can validate the numbers**. If Award Profile does not collect all funded students' information, the validity of this data varies by Consortia.
HE **# of Significant Investment**		Project Management>Activity Data Higher Education Form (Slide 61) Section D "Direct Significant Investment: please enter the total number of direct student participants who received significant investment. The number of significant investment students is a subset of the total number of direct funded participants."	Note: according to NASA OE Staff, this sentence was later changed. (NOTE; OEPM is saying to enter all students who received monetary funds and students with significant investment should be in Student Award form.) Validity: Low (different definition of significant investment used by Consortia). Evaluator will need to find documentation on how Consortia or even each affiliate defined significant investment. Award provide may be used for cross-check of the number. Reliability: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE # of non-student Direct participants by gender and by faculty status.	4-5 (FY2010), 23(FY2010) Please provide the following data as it pertains to the gender of the faculty and other non-student participants in your Higher Education Projects. Your response should include non-student Direct Participants. Recall that all student participants are to be reported in the FY2010 Student Data Tables. If the number is zero, please enter 0. Faculty - Male: Faculty – Female Other Participants - Male (Non-Faculty and participants not included in FY2010 Student Data Tables): Other Participants - Female (Non-Faculty and participants not included in FY2010 Student Data Tables)	Project Management>Activity Data Higher Education Form (Slide 61) Section D "Faculty/Researcher Participant Information Please enter the number of faculty/Researcher participants by institution type Faculty Researcher participants encompass faculty (tenure and non-tenure) researcher, participant, research assistant, staff. Please provide the number of faculty searcher participant (if zero, enter 0) Name (string) Institution Name and Department" (string)	FY2010-11 During Phase I, we discussed a definition of non-student participants varied by Consortia. Validity: low Reliability across Consortia: low FY2012-13 We did not ask a specific question about how Consortia collects and validate the number of faculty/researcher by institution type. Based on responses to a question of data collection process, Validity: Varies by Consortia. Some Consortia rely on affiliates' report of who participated, but other Consortia could talk directly with PI. Reliability across Consortia: Low
HE Description of Other Participants	4-6 (FY2010), 24(FY2011) Provide a description of "Other Participants" if applicable Open-Ended Response		Narrative
HE # of Non-student Direct Participant who are minority s by faculty and gender	4-7 (FY2010), 25(FY2011) "Please provide the following data as it pertains to the non-student Underrepresented Minority Participants in your Higher Education Projects. Your response should include non-student Direct Participants. Recall that all student participants are to be reported in the FY2010/FY2011 Student Data Tables. These data are a subset of the data collected in Question 5. If the number is zero, please enter 0 Faculty - Underrepresented Male Faculty - Underrepresented Female Other Participants - Underrepresented Male (Non-Faculty and participants not included in FY2010 Student Data Tables): Other Participants - Underrepresented Female (Non-Faculty and participants not included in FY2010 Student Data Tables"		Not covered in Consortia interview. During Phase I, we discussed a definition of non-student participants varied by Consortia. Validity: low Reliability across Consortia: low
HE Description Other Participants	4-8 (FY2010), 26(FY2011) Provide a description of "Other Participants" if applicable: Open-Ended Response		Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE # of Direct Participants with physical disability	4-9 (FY2010), 27(FY2011) "Please provide data regarding any Higher Education Direct participants with physical disabilities. Please include all STUDENT, FACULTY and OTHER participants (to avoid double counting, these data will not be aggregated with Student Data Tables) Male Person(s) with Disabilities: Female Person(s) with Disabilities:"		During Phase I, from the interview with NASA OE Staff, we learned there is no standardized definition of persons with disability. Validity: Low Reliability across Consortia: Low
HE Outcome: # of new course	4-10 (FY2010) NEW Higher Education Courses Supported by Space Grant(FY2011) "Please provide the following outcome data for all of your Higher Education Projects. Do not include any EPSCoR-related outcomes, results, etc. If the number is zero, please enter the number 0. NEW Higher Education Courses Supported by Space Gran Total Number of NEW Higher Education Courses using NASA-related content (supported by Space Grant FY2010 funds):	Project Management>Activity Data Higher Education Form (Slide 63) Section F "New and Revised Courses If your project included higher education course development during the period of this report, please answer the following questions. How many higher education courses have been developed using NSA related content/support? #	FY2010-2011 Validity: **Potentially high, but evaluators need to confirm the information by referencing numbers reported and actual course names reported, as well as the degree of Space Grant contribution**. Reliability: Potentially high, however, there is a possibility that performance period reported vary by Consortia. Evaluator needs to confirm with Consortia FY2012-2013 Validity: varies by Consortia depending on how data are reported to a lead affiliate. **With additional work by evaluator validity can be potentially high because Consortia reported actual course name, and evaluators can trace back information.** Reliability across Consortia: Current data is low (see above), but evaluator will be able to sort information out to align across Consortia by confirming performance period reported.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE Outcome: Name, description, location of New courses	4-11 (FY2010), 29 (FY2011) If you entered a number greater than zero, for each NEW COURSE, provide the Course Number, Title, Brief Description, and Location for each NEW Course: If you entered zero for the number of NEW COURSES supported by Space Funds, enter N/A Open-Ended Response	Project Management>Activity Data Higher Education Form (Slide 63) Section F New and Revised Courses Name, Course number, Institution Name and Department, # of Indirect Participants	FY2010-2011 Validity: **Potentially high, but evaluators need to confirm the information by referencing numbers reported and actual course names reported, as well as the degree of Space Grant contribution.** Reliability: Potentially high, however, there is a possibility that performance period reported vary by Consortia. Evaluator needs to confirm with Consortia FY2012-2013 Validity: varies by Consortia depending on how data are reported to a lead affiliate. **With additional work by evaluator validity can be potentially high because Consortia reported actual course name, and evaluators can trace back information.** Reliability across Consortia: Current data is low (see above), but evaluator will be able to sort information out to align across Consortia by confirming performance period reported.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE: Outcomes # of Revised Courses	4-12 (FY2010), 30(FY2011) REVISED Courses Supported by Space Grant - If the answer is zero, enter 0. Total Number of Higher Education REVISED Courses using NASA-related content (supported by Space Grant FY2010 Funds)	Project Management>Activity Data Higher Education Form (Slide 63) Section F How many higher education courses have been revised using NASA related content/support? (if zero etner0) #	FY2010-2011 Validity: **Potentially high, but evaluators need to confirm the information by referencing numbers reported and actual course names reported, as well as the degree of Space Grant contribution.** Reliability: Potentially high, however, there is a possibility that performance period reported vary by Consortia. Evaluator needs to confirm with Consortia FY2012-2013 Validity: varies by Consortia depending on how data are reported to a lead affiliate. **With additional work by evaluator validity can be potentially high because Consortia reported actual course name, and evaluators can trace back information.** Reliability across Consortia: Current data is low (see above), but evaluator will be able to sort information out to align across Consortia by confirming performance period reported.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE: Outcomes Name description, location of revised courses	4-13 (FY2010), 31(FY2011) If you entered a number of REVISED COURSES, provide the Course Number, Title, Brief Description, and Location for each REVISED Course: If you entered zero for the number of REVISED COURSES supported by Space Funds, enter N/A. Open-Ended Response	Project Management>Activity Data Higher Education Form (Slide 63) Section F Name of revised course, course number, institution name and department, # of indirect participants	FY2010-2011 Validity: **Potentially high, but evaluators need to confirm the information by referencing numbers reported and actual course names reported, as well as the degree of Space Grant contribution.** Reliability: Potentially high, however, there is a possibility that performance period reported vary by Consortia. Evaluator needs to confirm with Consortia FY2012-2013 Validity: varies by Consortia depending on how data are reported to a lead affiliate. **With additional work by evaluator validity can be potentially high because Consortia reported actual course name, and evaluators can trace back information.** Reliability across Consortia: Current data is low (see above), but evaluator will be able to sort information out to align across Consortia by confirming performance period reported.
HE: Description of collaboration between College so f Ed and Science/Engineering Department	4-14 (FY2010), 32(FY2011) "Please describe or provide example(s) of collaboration between the Colleges of Education and the Science and/or Engineering Colleges/Departments that exist in institutions throughout your Consortium (directly attributable to Space Grant effort/intervention). These examples can be new or long-standing relationships developed prior to FY2010/FY2011. Additionally, provide a brief summary of the outcome or benefit resulting from the collaboration. If there are no such collaborations that can be directly attributed to efforts made by your Space Grant Consortium, enter N/A. Open-Ended Response"		Narrative
HE Project Activity Start Date		Project Management> Higher Education Form (Slide 59) Section B "Project Activity Date Start , End date"	Validity: Low because Consortia and affiliates used different definition of start and end date/ Reliability: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
HE **Duration of Project Activity**		Project Management> Higher Education Form (Slide 59) Section B "What was the duration of your project activity Short event (-< 2 days) Long Event (> 2 days) Multi Month (semester/quarter) Yearlong (12 months)"	Validity: Low because Consortia used different definition Reliability: Low
HE Location of activity		Project Management> Higher Education Form (Slide 59) Section B If the project t activity was held in the US at a location other than a NASA center, please provide the city, state & zip code of the location. Activity location city Activity location state Activity location zip code If the project activity was held outside of the US, please provide the country, city and address (string)	Narrative
HE **# and Description of online STEM based teaching tools created**		Project Management> Higher Education Form (Slide 59) Section B How many online STEM based teaching tools were created and /or maintained as a result of this activity/project? Definition: an online STEM-based teaching tool is defined as a resource for K-12 and informal educators and higher education faculty that provides support to improve educators; STEM knowledge and/or enhances student interest and proficiency in STEM # Description, Category Type New, Existing	Validity: varies by Consortia depending on how data are collected. **With additional work by evaluators, potentially high**. Reliability across Consortia: Low **Evaluator will be able to confirm with Consortia or PIs because the courses are listed. Once validation of the courses is done by the evaluator, and once the definition of "as result of this project" is standardized, validity and reliability will be potentially high.**
HE **If the project provide opportunities for student to participate NASA project**		Project Management> Higher Education Form (Slide 60) Section C "Does this activity provide opportunities for students to participate in an existing NASA sponsored Yes, No, NA List project"	We did not ask a question on this particular data element. Based on the response on the process of data collection, Validity: Varies by Consortia because the way data recollected varied by Consortia. Reliability: low The evaluator will need to confirm with Consortia based on the list of project provided to map out what an activity providing opportunities for students to participate in existing NASA sponsored project" means.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
Pre-College			
PC **# of projects**	6-1 (FY2010), 39(FY2011) Please provide the following in terms of the aggregate of all Precollege projects Total number of projects:	Project Management>Activity Data Slide 40 CORE DATA Project Activity Name	FY2010-2011 Survey Monkey Validity: Low, because we do not know what projects are counted in this category. Reliability: Low because Consortia had different definition and the way of counting. FY2012-13 OEPM Validity: **High, because OEPM lists all activity name. However, some affiliates lead may not know why a particular activity was marked as PreCollege**. (See Phase II report) Reliability: low, because Consortia assigned sub element differently.
PC **# of affiliates involved**	6-1 (FY2010), 39(FY2011) Total number of affiliates involved in projects:	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Please provide the names of the affiliates that participated within this activity	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low
PC **# of non-affiliate organizations involved**	6-1 (FY2010), 39(FY2011) Total number of non-affiliate organizations involved in projects:	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Enter name of non-Affiliate Organization(s) if applicable	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low
PC **Name of affiliates participated**	6-2 (FY2010), 40(FY2011) Please list the affiliate members of your Consortium that participated in Precollege projects supported by FY2010 funds (separate institution names with a comma): Open-Ended Response	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Please provide the names of the affiliates that participated within this activity	Validity: Varies by Consortia, depending on how data are collected. Evaluators will need to learn from Consortium how they decided to list organizations as participating affiliates. Reliability: Low
PC Name of non-affiliate organizations participated	6-3 (FY2010), 41(FY2011) "If applicable, please provide the name of any non-affiliate organizations that participated in Precollege projects supported by FY2010 funds (separate institution names with a comma):" Open-Ended Response	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Enter name of non-Affiliate Organization(s) if applicable	Validity: Varies by Consortia, depending on how data are collected. Evaluators will need to learn from Consortium how they decided to list organizations as participating affiliates. Reliability: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
PC: Description of projects	6-4 (FY2010), 42(FY2011) "Please provide a brief description of the general nature and types of projects supported in Precollege. Open-Ended Response"	Project Management>Activity Data (Slide 40) CORE DATA "Activity Description: Please provide a short (a paragraph or so) description of the activity, its goals and objectives and unique characteristics. This section should include special contributions and products to be completed by participants." (String)	Narrative
PC If the activity is ongoing activity		Project Management>Activity Data (Slide 40) CORE DATA "Is this an ongoing activity? Yes No"	Validity: Varies by Consortia because the performance period reported and the way data were collected vary. Evaluators will need to confirm with Consortia. Reliability across Consortia: Low
PC Competitiveness		Project Management>Activity Data Slide 40 CORE DATA "Competitiveness Describe the competitiveness of this activity including eligibility and selection criteria"	Narrative
PC: NASA Connections		Project Management>Activity Data (Slide 41) CORE DATA "NASA Connections This activity is in alignment with the priorities of the following connections (Mark all that apply) Aeronautics Research Mission Directorate Human Exploration & Operations (HEOP Office of Chief Technologist Science Mission Directorate OE Other (Specify) None of the above"	We did not ask specific question on this data element, however, based on the way Consortia collect data, Validity: Varies by Consortia because data collection process varied by Consortia. Reliability across Consortia: low
PC Partnership institutions, NASA Centers, and Description		Project Management>Activity Data (Slide 41) CORE DATA A Partnership is a reciprocal and voluntary relationship between the activity personnel and NASA, industry, or other partners to cooperatively achieve the goals of the activity. Was there a partnership with a NASA center on this activity? Yes Institution Name" (string) "NASA Centers Description of partnership" (String)	Narrative
PC: Project Activity Start and End Date		Project Management > Pre College Form (Slide 65) Section A Project Activity Date: Start End	Validity: Varies by Consortia. Some affiliates used different definition of start and end date/ Reliability: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
PC **Duration of project activity**		Project Management > Pre College Form (Slide 65) (NOTE: OEPM does not distinguish student and educator PD) "What was the duration of your project activity Short Event (-< 2 days) Long Event (>2 days) Multi Month (semester/quarter) Yearlong (12 months)"	Validity: Varies by Consortia depending on how they collected data. Reliably across Consortia: Low. The performance period reported varies.
PC Location of the project		Project Management > Pre College Form (Slide 65) "If the project activity was held in the US at a location other than a NASA center, please provide the city, state & zip code of the location. Activity location city Activity Location State Activity Location zip code If the project activity as held outside of the US, please provide the country, city and address." (string)	Narrative
PC: **If the Consortia provided activity for middle school educators, students, and Summer of Innovation**	6-5 (FY2010), 43(FY2011) Did your Consortium use FY2010 Space Grant resources in support of the following (check all that apply): Activity Exclusively Targeted Toward Middle School Educators Activity Exclusively Targeted Toward Middle School Students Activity in support of the NASA Summer of Innovation N/A	Project Management > Pre College Form (Slide 65) Section A Enter the number of events supported by this project # Educator Professional Development Student Engagement	We did not ask a question on this particular data element. Based on the response on the process of data collection, Validity: Varies by Consortia because the way data are collected varied by Consortia. Reliability: low
PC: Description of middle school educator, students, Summer of Innovation activity	6-6 (FY 2010), 44(FY2011) Please provide a brief description of any project or activity that exclusively targeted middle school educators, middle school students, and/or was in support of the NASA Summer of Innovation (using FY2010 Space Grant resources). Enter N/A if not applicable to your Consortium Open-Ended Response		Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
PC # of Professional Workshop for teachers by long and short duration	6-7 (FY2010), 45(FY2011) Please provide the following outcome data for the Precollege projects supported by FY2010 funds Total Number of Professional Development Workshops for Teachers (Short Duration, less than 2 days in length): Total Number of Professional Development Workshops for Teachers (Long Duration, greater than or equal to 2 days in length):		Validity: Low in FY 2010, Consortia defined project differently. It is not clear how Consortia counted the number of workshops and activities. Reliability: Low.
PC # of student based project by short and long duration **# of Interactive K-12 student activity**	6-7 (FY2010), 45(FY2011) "Total Number of Student-based Projects Supported by Space Grant (Short Duration, less than 2 days in length): Total Number of Student-based Projects Supported by Space Grant (Long Duration, greater than or equal to 2 days in length):"	Project Management> Pre College Form (Slide 66) Section B. "How many **interactive K-12 student activities are offered?** Student Participants: Does this project contain **pre college student based components"** Yes No If Yes, please explain how the **student-based component** quantitatively contributes to the STEM pipeline (string) (Slide 67) Section C "# of **Student Based Activity –Short Duration (<2 days)** **# of Student based activity- Long Duration (>= 2 days**)"	FY2010-2011 Validity: Low because Reliability: Low FY2012-2013 Validity: Varies by Consortia depending on how they collected data. Reliably across Consortia: Low. The performance period reported varies.
PC # of Direct Participants by Type	6-8 (FY2010), 46 (FY2011) "Please provide data regarding the total number of DIRECT participants in the Precollege projects supported by the Consortium Direct Participants - In-service Educators: Direct Participants - Preservice Educators: Direct Participants - Informal Educators/Museum Staff: Direct Participants - Precollege Students: Direct Participants – Administrators Direct Participants - Parents/Guardians: Direct Participants - Higher Education Students (non-Preservice): Direct Participants - Higher Education Faculty: Direct Participants - Public at Large: Direct Participants - Other Adult: Direct Participants - Other:	Project Management> Pre College Form (Slide 68) Section D "Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals hat are direct beneficiaries of the activity (i.e., participants and or attendees that may have registered for the activity), Indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated (i.e. Students that participate in revised courses that were developed via activity funds) Number of Direct Interaction by the participant type Elementary School Teachers Middle School Teachers High School Teachers Pre Service Teachers Informal Educators Higher Education Faculty Elementary School Students Middle School Students High School Students Undergraduate Graduate Post-Doctoral	Validity: varies by Consortia. As Phase II findings show some Consortia relied on affiliates' report, and although all 5 Consortia agreed that they defined participate as actually attending the event/workshop, and some talked about affiliates or PIs using sign in sheet, they rarely validated the number, and at least one consortium reported sometimes PIs or affiliates had challenge of getting consistent data. Reliability across Consortia: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
		Administrators Parents/Guardians Public at Large Other"	
PC Description of "Other" Direct Participants	6-9 (FY2010), 47(FY2011) Description of "Other" Participants: Open-Ended Response		Narrative
PC # of Direct Unique Participants, participants whose primary affiliation is with another project, and project name		Project Management> Pre College Form (Slide 69) Section E "Please enter the number of direct participants that are unique to your activity/project. … The actual number of individuals served. If an individual has been counted before in another activity they should not be double counted here. # of Unique participants, Unique participants whose primary affiliation is with another project, and primary project affiliated by the participant type Elementary School Teachers Middle School Teachers High School Teachers Pre Service Teachers Informal Educators Elementary School Students Middle School Students High School Students"	We did not ask a question, how Consortia collect and validate the number of unique direct participants and their primary affiliation. Based on responses to a question on the process of data collection. Validity: varies by Consortia. As Phase II findings show some Consortia relied on affiliates' report, and although all 5 Consortia agreed that they defined participate as actually attending the event/workshop, and some talked about affiliates or PIs using sign in sheet, they rarely validated the number, and at least one consortium reported sometimes PIs or affiliates had challenge of getting consistent data. Reliability across Consortia: Low
PC # of Indirect Participants		Project Management> Pre College Form (Slide 68) Section D Enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals hat are direct beneficiaries of the activity (i.e., participants and or attendees that may have registered for the activity), Indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated (i.e. Students that participate in revised courses that were developed via activity funds) Number of Indirect Interaction by the participant type Elementary School Teachers Middle School Teachers High School Teachers Pre Service Teachers Informal Educators Higher Education Faculty Elementary School Students Middle School Students	Validity: varies by Consortia, but in general, low Reliability across Consortia: low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
		High School Students Undergraduate Graduate Post-Doctoral Administrators Parents/Guardians Public at Large Other	
PC # of Direct Participant who are Funded students		Project Management>Activity Data Pre College Form (Slide 70) Section F "Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be a subset of the total Direct Student Participants recorded in the table above. Direct funded student participants do not include recipients of reimbursements (i.e., travel, supplies, meals, et)"	This number may or may not be cross-referenced and validated by using Award Profile data. If Award Profile collects all funded students regardless the amount, the evaluators can validate the numbers. If Award Profile does not collect all funded students' information, the validity of this data varies by Consortia. NASA's guidance seems to be saying that students who were funded by Pre College should not be included in Award Profile. So, the validity of this number varies by Consortia.
PC # of Significant Investment		Project Management>Activity Data Pre College Form (Slide 70) Section F "Direct Significant Investment: please enter the total number of direct student participants who received significant investment. The number of significant investment students is a subset of the total number of direct funded participants."	Note: according to NASA OE Staff, this sentence was later changed. (NOTE; OEPM is saying to enter all students who received monetary funds and students with significant investment should be in Award Profile form.) Validity: If cross reference with Award Profile is possible, potentially high. **Award Profile may be used for cross-check of the number.** Evaluator will need to find documentation on how Consortia defined significant investment Reliability: Low
PC Description of Higher ed students, faculty	6-10 (FY2010), 48(FY2011) "Describe the involvement of Higher Education Students and Faculty in the conduct of Precollege projects. Enter N/A if not applicable. Open-Ended Response	Project Management > Pre College Form (Slide 71) Section G "Please describe the involvement of higher education students and faculty in the conduct of this element of the overall project."	Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
PC Existence and description of evaluation mechanism to report contribution to STEM pipeline.	6-11 (FY2010), 49(FY2011) "Are evaluation mechanisms in place which demonstrate that student-based project(s) quantitatively contribute to the STEM pipeline? Yes No Not Applicable Please provide a brief explanation:"	Project Management> Pre College Form (Slide 66) Section B. "How many interactive K-12 student activities are offered? Student Participants: Does this project contain pre college student based components" Yes No If Yes, please explain how the student-based component quantitatively contributes to the STEM pipeline "(string)	FY2010-2011 Narrative FY2012-2013 Validity: varies by Consortia depending on how data are collected and validated. Reliability across Consortia: Low The evaluator will need to review the description to understand how Consortia conducted evaluation of Pre College activities, or how Consortia envisioned the activity would contribute to STEM pipeline. This information can be cross referenced with the description of program outcome and PART measures reported, but it may not provide a clear picture of the contribution of a specific project activity because data collection of PART measures on OEPM might have been discontinued sometime in FY 2012 and FY 2013.
PC Existence and description of evaluation to teacher use of NASA materials	6-12 (FY2010), 50(FY2011) "Are evaluation mechanisms in place which demonstrate that teachers utilize Space Grant supported materials/knowledge/experience in their classrooms? Yes, No Not Applicable Please provide a brief explanation:"	Project Management > Pre College Form (Slide 66) Section B "Are evaluation mechanisms in place to demonstrate that teacher utilizing the materials/knowledge in their classrooms? Yes, No, NA, Please explain" (Siring)	Narrative
PC Explanation of variance in expenditure, 3 of project, participants, workshops, student based project and evaluation strategies	6-13 (FY2010), 51(FY2011) "Comparison of FY2009 Performance Data Report to FY2010 Submission: Please provide an explanation of any variances between the two reporting periods in terms of the following data elements: Expenditure Summary, Number of Projects, Participants, and Professional Development Workshops for Teachers, Student-based Projects, and/or Evaluation Strategies. If there are no significant variances between the two reporting periods, please provide a brief statement that the comparison was completed Open-Ended Response"		Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
PC **# and Description of online STEM based teaching tools created**		Project Management> Higher Education Form (Slide 66) Section B "How many online STEM based teaching tools were created and /or maintained as a result of this activity/project? Definition: an online STEM-based teaching tool is defined as a resource for K-12 and informal educators and higher education faculty that provides support to improve educators; STEM knowledge and/or enhances student interest and proficiency in STEM # Description, Category Type New, Existing"	Validity: varies by Consortia depending on how data are collected. Reliability across Consortia: Low Once validation of the courses is done by the evaluator, and once the definition of "as result of this project" is standardized, potentially high. Evaluator will be able to confirm with Consortia or PIs because the courses are listed. Once validation of the courses is done by the evaluator, and once the definition of "as result of this project" is standardized, validity and reliability will be potentially high.
PC If project activity provide opportunity for Pre College educators to participate in NASA project		Project Management > Pre College Form (Slide 66) Does this activity provide opportunities for Pre College Educators to participate in an existing NASA sponsored project? Yes, No, NA Project Name	We did not ask a question on this particular data element. Based on the response on the process of data collection, Validity: Varies by Consortia because the way data recollected varied by Consortia. Reliability: low The evaluator will need to confirm with Consortia based on the list of project provided to map out what an activity providing opportunities for students to participate in existing NASA sponsored project" means.
PC **If the project provide opportunities for students to predicate in existing NAS Project**		Project Management > Pre College Form (Slide 67) Does this activity provide opportunities for students to participate in an existing NASA sponsored Project? Yes, No NA Project Name	We did not ask a question on this particular data element. Based on the response on the process of data collection, Validity: Varies by Consortia because the way data recollected varied by Consortia. Reliability: low The evaluator will need to confirm with Consortia based on the list of project provided to map out what an activity providing opportunities for students to participate in existing NASA sponsored project" means.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
PC **# of any other activities supported by project and description**		Project Management > Pre College Form (Slide 71) Please enter the number of any other activities supported by this project and provide a description # Other Description (string)	Narrative
Informal Education			
IE **# of projects**	7-1 (FY2010), 52(FY2011) Please provide the following in terms of the aggregate of all Informal Education projects: Total number of projects:	Project Management>Activity Data Slide 40 CORE DATA Project Activity Name	FY2010-2011 Survey Monkey Validity: Low, because we do not know what projects are counted in this category? Reliability: Low because Consortia had different definition and the way of counting. FY2012-13 OEPM Validity: High, because OEPM lists all activity name. However, some affiliates lead may not know why a particular activity was marked as Research Infrastructure. (See Phase II report) Reliability: low, because Consortia assigned sub element differently.
IE **# of affiliates involved**	7-1 (FY2010), 52(FY2011) Total number of affiliates involved in projects:	Project Management>Activity Data Slide 41 CORE DATA Select Participating Affiliates Please provide the names of the affiliates that participated within this activity	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low
IE **# of non-affiliate organizations involved**	7-1 (FY2010), 52(FY2011) "Total number of non-affiliate organizations involved in projects"	Project Management>Activity Data Slide 41 CORE DATA "Select Participating Affiliates Enter name of non-Affiliate Organization(s) if applicable"	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low
IE **Name of affiliates participated**	7-2 (FY2010), 53(FY2011) "Please list the affiliate members of your Consortium that participated in Informal Education projects supported by FY2010 funds (separate institution names with a comma): Open-Ended Response"	Project Management>Activity Data Slide 41 CORE DATA "Select Participating Affiliates Please provide the names of the affiliates that participated within this activity"	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
IE Name of non-Affiliates participated	7-3 (FY2010), 54(FY2011) "If applicable, please provide the name of any non-affiliate organizations that participated in Informal Education projects supported by FY2010 funds (separate institution names with a comma) Open-Ended Response"	Project Management>Activity Data Slide 41 CORE DATA "Select Participating Affiliates Enter name of non-Affiliate Organization(s) if applicable"	FY2010-2011 Survey Monkey Validity: Low Reliability: Low FY2012-2013 OEPM Validity: Varies by Consortia by how data are collected. Reliability across Consortia: Low
IE: Description of projects	7-4 (FY2010), 55(FY2011) "Please provide a brief description of the general nature and types of projects supported in Informal Education Open-Ended Response"	Project Management>Activity Data (Slide 40) CORE DATA "Activity Description: Please provide a short (a paragraph or so) description of the activity, its goals and objectives and unique characteristics. This section should include special contributions and products to be completed by participants." (String)	Narrative
IE: Ongoing activity		Project Management>Activity Data (Slide 40) CORE DATA "Is this an ongoing activity? Yes No"	Validity: Varies by Consortia because the performance period reported and the way data were collected vary. Evaluators will need to confirm with Consortia. Reliability across Consortia: Low
IE: Competitiveness		Project Management>Activity Data (Slide 40) CORE DATA Competitiveness Describe the competitiveness of this activity including eligibility and selection criteria (String)	Narrative
IE: NASA Connections		Project Management>Activity Data (Slide 41) CORE DATA "NASA Connections This activity is in alignment with the priorities of the following connections (Mark all that apply) Aeronautics Research Mission Directorate Human Exploration & Operations (HEOP Office of Chief Technologist Science Mission Directorate OE Other (Specify) None of the above"	We did not ask specific question on this data element, however, based on the way Consortia collect data, Validity: Varies by Consortia because data collection process varied by Consortia. Reliability across Consortia: low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
IE: Partnership institutions, NASA Centers, and description		Project Management>Activity Data (Slide 41) CORE DATA "A Partnership is a reciprocal and voluntary relationship between the activity personnel and NASA, industry, or other partners to cooperatively achieve the goals of the activity. Was there a partnership with a NASA center on this activity? Yes, Institution Name" (string) "NASA Centers Description of partnership" (String)	Narrative
IE: Components of IE		Project Management:>Informal Education Form (Slide 47) "The project includes the following component s (Mark all that apply). Informal Education Project must contain at least two of the three component s Supplemental Materials/Handouts Staffing Standards-based and /or learning objective content"	We did not ask specific question on this data element, however, based on the way Consortia collect data, Validity: Varies by Consortia because data collection process varied by Consortia. Reliability across Consortia: low
IE # of Professional development workshops for informal educators by long and short duration	7-5 (FY2010), 56(FY2011) "Please provide the following outcome data for the Informal Education projects supported by FY2010 funds. Total Number of Professional Development Workshops for Informal Educators (Short Duration, less than 2 days in length) Total Number of Professional Development Workshops for Informal Educators (Long Duration, greater than or equal to 2 days in length):"	Project Management:>Informal Education Form (Slide 48) Section B "Enter the number of each type of activity supported by this project Informal Educator Professional Development – Short Duration (<2 days) Informal Educator Professional Development – Long Duration (>= 2 days)"	FY2010-2011 Validity: Low Reliability: Low FY2012-2013 Validity: Varies by Consortia depending on how they collected data. Reliably across Consortia: Low. The performance period reported varies.
IE # of Exhibits	7-5 (FY2010), 56(FY2011) Total Number of Exhibits Supported/Developed using Space Grant funds:	Project Management> Informal Education Form (Slide 48) Section B Enter the number of each type of activity supported by this project Exhibit Supported/developed	FY2010-2011 Validity: Low Reliability: Low FY2012-2013 Validity: Varies by Consortia depending on how they collected data. Reliably across Consortia: Low. The performance period reported varies.
IE # of student hands on activities	7-5 (FY2010), 56(FY2011) Total Number of "Student Hands-On Activities" Supported:	Project Management> Informal Education Form (Slide 48) Section B Enter the number of each type of activity supported by this project Student Hands on Activity	FY2010-2011 Validity: Low Reliability: Low FY2012-2013 Validity: Varies by Consortia depending on how they collected data. Reliably across Consortia: Low. The performance period reported varies.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
IE **# of public at large activities**	7-5 (FY2010), 56(FY2011) Total Number of "Public at Large" Activities Supported:	Project Management> Informal Education Form (Slide 48) Section B Enter the number of each type of activity supported by this project Public at large activities	FY2010-2011 Validity: Low Reliability: Low FY2012-2013 Validity: Varies by Consortia depending on how they collected data. Reliably across Consortia: Low. The performance period reported varies.
IE # of other activities		Project Management> Informal Education Form (Slide 48) Section B Enter the number of each type of activity supported by this project Other	Narrative
IE **Project Activity Start and End Date**		Project Management> Informal Education Form (Slide 48) Section B Project Activity Date: Start MM/DD/YYYY End MM/DD/YYYY	Validity: Low because Consortia used different definition of start and end date/ Reliability: Low
IE **Duration of project activity**		Project Management: Informal Education Form (Slide 48) Section B What was your duration of your project activity? Short Event (<2 days) Long Event (> 2 days) Multi-Month (semester. quarter) Year-long (12 months)	Validity: Varies by Consortia depending on how they collected data. Reliably across Consortia: Low. The performance period reported varies.
IE **Activity location other than NASA Center**		Project Management: Informal Education Form (Slide 48) Section B "If the project activity was held in the US at a location other than a NASA Center, please provide the city, state, & Zip code of the location Activity Location City Activity Location Zip Code Activity Location State If the project activity was held outside of the US, please provide the country, city and address" (String)	Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
IE **# of Online STEM based teaching tools and description of tools**		Project Management: Informal Education Form (Slide 49) Section C How many online STEM based teaching tools were created and/or maintained as a result of this activity/project? Definition: An Online STEM based teaching tool is defined as a resource for K12 and informal educators and higher education faculty that provides support to improve educators' STEM knowledge and /or enhances student interest and proficiency in STEM # Description, Category Type, New/Existing	Validity: varies by Consortia depending on how data are collected. Reliability across Consortia: Low Once validation of the courses is done by the evaluator, and once the definition of "as result of this project" is standardized, potentially high. Evaluator will be able to confirm with Consortia or PIs because the courses are listed. Once validation of the courses is done by the evaluator, and once the definition of "as result of this project" is standardized, validity and reliability will be potentially high.
IE **If , opportunity for IE to participate in NASA project, project name**		Project Management: Informal Education Form (Slide 49) Section C "Does this project provide opportunities for Informal Education to participate in an existing NASA sponsored project? Yes, No, NA Project Name"	We did not ask a question on this particular data element. Based on the response on the process of data collection, Validity: Varies by Consortia because the way data recollected varied by Consortia. Reliability: low The evaluator will need to confirm with Consortia based on the list of project provided to map out what an activity providing opportunities for students to participate in existing NASA sponsored project" means.
IE **If, the project activity provide opportunity for students to participate in NASA project**		Project Management: Informal Education Form (Slide 49) Section C "Does this project provide opportunities for students to participate in an existing NASA sponsored project? Yes, No, NA Project Name"	We did not ask a question on this particular data element. Based on the response on the process of data collection, Validity: Varies by Consortia because the way data recollected varied by Consortia. Reliability: low The evaluator will need to confirm with Consortia based on the list of project provided to map out what an activity providing opportunities for students to participate in existing NASA sponsored project" means.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
IE **# of direct participants by type**	7-6 (FY2010), 57(FY2011) Please provide data regarding the total number of DIRECT PARTICIPANTS in the Informal Education projects supported by the Consortium. Provide numbers for the categories which correspond with data you collected; enter zero in categories as necessary. For all other direct participants, please enter them in "Other". Direct Participants - In-service Educators Direct Participants - Preservice Educators Direct Participants- Informal Educators/Museum Staff Direct Participants - Precollege Students Direct Participants - Administrators Direct Participants - Parents/Guardians: Direct Participants - Higher Education Students (non-Preservice) Direct Participants - Higher Education Faculty: Direct Participants - Public at Large: Direct Participants - Other Adult: Direct Participants - Other:	Project Management: Informal Education Form (Slide 50) Section D Please enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that and that are direct beneficiaries of the activity (i.e., participants and or attendees that may have registered for the activity) Indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated (ies, students that participate in revised courses that were developed via activity funds) Elementary School Teachers Middle School Teachers High School Teachers Pre Service Teachers Informal Educators Higher Education Faculty Elementary School Students Middle school Students High School Students Undergraduate Graduate Post-Doctoral Administrators Parents/Guardians Public at Large Other	FY2010-11 Validity: Because the number of project was not defined clearly, it is not clear in FY 2010 how Consortia counted the number of activities and participants Reliability: Low FY2012-13 Validity: varies by Consortia. As Phase II findings show some Consortia relied on affiliates' report, and although all 5 Consortia agreed that they defined participate as actually attending the event/workshop, and some talked about affiliates or PIs using sign in sheet, they rarely validated the number, and at least one consortium reported sometimes PIs or affiliates had challenge of getting consistent data. Reliability across Consortia: Low
IE **Description of Other Direct Participants**	7-7 (FY2010), 58(FY2011) Description of "Other" Participants: Open-Ended Response		Narrative
IE **# of Direct Unique Participants, and # of Unique participants whose primary affiliation is another project**		Project Management> Informal Education Form (Slide 51) Section E "Please enter the number of direct participants that are unique to your activity/project. The unique participant fields are fields that indicate the actual number of individuals served. If an individual has been counted before in another activity they should not be doubled counted here. Number of Unique Participants, Unique Participants whose primary affiliation is with another project, and Primary Project Affiliation by the following participant types. Elementary School Teachers Middle School Teachers	We did not ask a question, how Consortia collect and validate the number of unique direct participants and their primary affiliation. Based on responses to a question on the process of data collection. Validity: varies by Consortia. As Phase II findings show some Consortia relied on affiliates' report, and although all 5 Consortia agreed that they defined participate as actually attending the event/workshop, and some talked about affiliates or PIs using sign in sheet, they

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
		High School Teachers Pre Service Teachers Informal Educators Higher Education Faculty Elementary School Students Middle school Students High School Students Undergraduate Graduate Post-Doctoral Administrators Parents/Guardians Public at Large Other"	rarely validated the number, and at least one consortium reported sometimes PIs or affiliates had challenge of getting consistent data. Reliability across Consortia: Low
IE #of Indirect Participants		Project Management: Informal Education Form (Slide 50) Section D "Please enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that and that are direct beneficiaries of the activity (i.e., participants and or attendees that may have registered for the activity) Indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated (i.e., students that participate in revised courses that were developed via activity funds) Elementary School Teachers Middle School Teachers High School Teachers Pre Service Teachers Informal Educators Higher Education Faculty Elementary School Students Middle school Students High School Students Undergraduate Graduate Post-Doctoral Administrators Parents/Guardians Public at Large Other"	Validity: varies by Consortia, but in general, low Reliability across Consortia: low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
IE **Involvement of Higher Ed students and faculty**	7-8 (FY2010), 59(FY2011) "Describe the involvement of Higher Education Students and Faculty in the conduct of Informal Education projects. Enter N/A if not applicable Open-Ended Response"	Project Management: Informal Education Form (Slide 56) "Please describe the involvement of higher education students and faculty in the conduct of this element of the overall project" (String)	Narrative
IE **Explanation of the change in expenditure, # of projects, participants, workshops, student hands on activities, public at large activities and evaluation strategies.**	7-9 (FY2010), 60(FY2011) "Comparison of FY2009 Performance Data Report to FY2010 Submission: Please provide an explanation of any variances between the two reporting periods in terms of the following data elements: Expenditure Summary, Number of Projects, Participants, Professional Development Workshops, Student Hands-On Activities, Public at Large Activities, and/or **Evaluation Strategies.** If there are no significant variances between the two reporting periods, please provide a brief statement that the comparison was completed Open-Ended Response"		Narrative (Note: FY 2010, FY2011, survey monkey mansions Evaluation strategies, in this question, but there is no question about evaluation strategy for IE)
IE **# of Directly Funded students**		Project Management: Informal Education Form (Slide 52) Section F Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be subset of the Total Direct Student participants recorded in the table above. Direct funded student participants do not include students of reimbursement s (i.e., travel, supplies, meals, etc.)	This number may or may not be cross-referenced and validated by using Award Profile data. If Award Profile collects all funded students regardless the amount, the evaluators can validate the numbers. If Award Profile does not collect all funded students' information, the validity of this data varies by Consortia. NASA guidance seems to be saying that students funded through Informal Education should not be included in Award Profile. If it is true, validity varies by Consortia.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
IE Number of Significant Investment Student		Project Management: Informal Education Form (Slide 52) Section F Significant Investment: Please enter the total number of direct student participants who received a significant investment (The total number of significant investment students is a subset of the total number of direct funded participants) Significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support. 160 or greater hours of direct contact, of some of other support considered "significant") For some projects the minimum level determining significant investment may be greater.	Note: according to NASA OE Staff, this sentence was later changed. (NOTE; OEPM is saying to enter all students who received monetary funds and students with significant investment should be in Student Award form.) Validity: Low (different definition of significant investment used by Consortia). Evaluator will need to find documentation on how Consortia defined significant investment. Award provide may be used for cross-check of the number. Reliability: Low
Outcomes (Outcome 1 – Survey Monkey, selected data from OEPM Core Form)			
Results for NASA OUTCOME I: Success Story	5-1(FY2010), 33(FY2011) NASA OE Outcome 1: Contribute to the development of science, technology, engineering, and mathematics (STEM) workforce in disciplines needed to achieve NASA's strategic goals (Employ and Educate). The primary achievements of your Fellowship/Scholarship, Research Infrastructure, and Higher Education Programmatic Elements should be provided as requested in the following questions. In order to avoid double counting, if a particular achievement spanned multiple Programmatic Elements, it should only be represented in your summary data one time. If you did not collect the data requested or if the answer is zero, please enter "0". 5-1 (FY2010), 33(FY2011) Provide at least one anecdotal single point of success in terms of NASA workforce development. This could be a particular student "success story". Include any URLs to press releases, etc. Open-Ended Response		Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
OUTCOME **# of authors**	5-2 (FY2010), 34(FY2011) FS. RI. HE "The following data pertain to the results/outcomes that contribute to NASA OE Outcome I. For each question below, the answer should reflect the aggregate across your **Fellowship/Scholarship, Research Infrastructure, and Higher Education Programmatic Elements**. These data are EXCLUSIVE of EPSCoR outputs, outcomes, and/or results. DO NOT include any data attributable to EPSCoR. Please enter a value for each requested data point. If the number is zero, please enter the number 0. Please enter whole numbers; no decimals or other characters. How many AUTHORS have PUBLISHED RESULTS of research/activities directly attributable to projects supported by Space Grant?"	Project Management> Activity Data CORE DATA (Slide 42) Publications and Presentations: How many authors have published results or research/activities directly attributed to this activity? (Numerical)	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 Validity: **Current form of data is Low, but can be high.** The way data are collected varied by Consortia. However, since the actual author and title are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
OUTCOME **Name of Publication**		Project Management> Activity Data CORE DATA (Slide 42) Please provide the following information for each publication Author Year Title Publication Peer Reviewed Author Category	FY2012-13 **Validity: Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the actual author and title are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
OUTCOME **# of authors submitted manuscript but not published**	5-2(FY2010), 34(FY2011)) FS. RI. HE How many authors have SUBMITTED MANUSCRIPTS of research/activities directly attributable to projects supported by Space Grant, but are NOT YET PUBLISHED?	Project Management> Activity Data CORE DATA (Slide 42) "Publications and Presentations: How many authors have submitted manuscripts of research/activities directly attributed to this activity, but are not yet published? (if none, enter 0)"	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 Validity: **Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the actual author and title are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
Name of manuscript		Project Management> Activity Data CORE DATA (Slide 42) "Publications and Presentations Please provide the following information for each publication Author Year Title Publication Peer Reviewed Author Category"	**Validity: Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the actual author and title are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
OUTCOME **# of invited papers**	5-2 (FY2010), 34(FY2011)) FS. RI. HE How many INVITED PAPERS, based on research/activities directly attributed to projects supported by Space Grant, were presented?	Project Management> Activity Data CORE DATA (Slide 42) Publications and Presentations How many invited papers based on research/activities directly attributed to this activity were presented? (if none, enter 0)	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 **Validity: Current form is Low, but potentially high.** The way data are collected varied by Consortia. However, since the actual author and title are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
Name of invited papers		Project Management> Activity Data CORE DATA (Slide 42) Publications and Presentations Please provide the following information for each publication Title Presenter Venue	**Validity: Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the actual author and title are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
OUTCOME **# of self-submitted papers**	5-2(FY2010), 34(FY2011)) FS. RI. HE How many SELF-SUBMITTED PAPERS based on research/activities directly attributed to projects supported by Space Grant, were PRESENTED at conferences that use a REVIEW PROCESS?	Project Management> Activity Data CORE DATA (Slide 42) Publications and Presentations How many self-submitted papers based on research/activities… process (if none, enter 0)	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 **Validity: Current form is Low, but potentially high.** The way data are collected varied by Consortia. However, since the actual author and title are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information and reporting period.
Name of self-submitted papers		Project Management> Activity Data CORE DATA (Slide 42) Publications and Presentations Please provide the following information for each publication Title Presenter Venue (string)	**Validity: Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the actual author and title are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
OUTCOME **# of Patents Applied**	5-2 (FY2010), 34(FY2011)) FS. RI. HE How many PATENTS, based on research/activity supported by Space Grant, have been APPLIED FOR?	Project Management> Activity Data CORE DATA (Slide 43) Patents and Technology Transfers How many patents, based on research/activities associated with this activity, have been applied for? (if none, enter 0)	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 **Validity: Current form is Low, but potentially high.** The way data are collected varied by Consortia. However, since the description of patent is reported, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
OUTCOME **# of Patents granted**	5-2 (FY2010), 34(FY2011)) FS. RI. HE How many PATENTS, based on research/activity supported by Space Grant, have been GRANTED?	Project Management> Activity Data CORE DATA (Slide 43) Patents and Technology Transfers How many patents, based on research/activities associated with this activity, have been granted? (if none, enter 0)	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 **Validity: Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the patent and associated information are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
Name of granted patent		Project Management> Activity Data CORE DATA (Slide 43) Please list granted patent Patent, Date received	**Validity: Current form is Low, but potentially high.** The way data are collected varied by Consortia. However, since the patent and associated information are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
OUTCOME **# of Patent licenses issued**	5-2(FY2010), 34(FY2011)) FS. RI. HE How many PATENT LICENSES, based on research/activities supported by Space Grant, have been ISSUED?	Project Management> Activity Data CORE DATA (Slide 43) How many patent licenses, based on research/activities associated with this activity, have been issued (if none, enter 0)	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 **Validity: Current form is Low, but potentially high.** The way data are collected varied by Consortia. However, since the patent and associated information are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
Name of Patent Licenses issued		Project Management> Activity Data CORE DATA (Slide 43) Please list issued licenses	

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
Outcome # of Technology Transfer	5-2(FY2010), 34(FY2011)) FS. RI. HE How many TECHNOLOGY TRANSFER activities have RESULTED from research/activities supported by Space Grant?	Project Management> Activity Data CORE DATA (Slide 43) Patents and Technology Transfers: How many technology transfer activities have resulted from research/activities associated with this activity? (if none, enter 0)	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 **Validity: Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the patent and associated information are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
Description of technical transfer activities		Project Management> Activity Data CORE DATA (Slide 43) Patents and Technology Transfers: Please list technical transfer activities Activity Transfer Partner	Validity: **Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the patent and associated information are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
Activity's contribution to goals and objectives of the project/agreement with NASA OE		Project Management> Activity Data CORE DATA (Slide 44) How does this activity contribute to meeting the goals and objectives of the project/agreement with NASA education?	Narrative
Evaluation—matrix/measures used to measure effectiveness of activity		Project Management> Activity Data CORE DATA (Slide 44) What metrics of measures are documented (captured) through the evaluation process, to determine the effectiveness of activity?	Narrative

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
Outcome **# of proposals for additional funding submitted and dollar value**	5-3(FY2010), 35(FY2011) RI, HE "The following data should reflect the proposals developed (supported) by Space Grant for funding from other sources and attributable to your **Research Infrastructure and Higher Education programmatic elements.** These data should not include other NASA Space Grant-related opportunities (e.g. EPSCoR, ESMD, Consortium Development Competition, etc.). If the number is zero, please enter "0". Please enter whole numbers; no decimals or other characters How many PROPOSALS for additional funding (NASA and external), based on research/activity supported by Space Grant, were SUBMITTED? What is the total dollar value of the amount requested through PROPOSALS SUBMITTED?"	Project Management> Activity Data CORE DATA (Slide 43) Proposals How many proposals for additional funding (NASA and External) based on activities associated with this activity, were submitted? (if none, enter 0)	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 **Validity: Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the proposal title and associated information are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
Name of Proposals		Project Management> Activity Data CORE DATA (Slide 43) Proposals Proposal Title Institution Name of Funding Organizations Type of Funding Organization Amount Requested Amount Received	**Validity: Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the proposal title and associated information are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
OUTCOME # of proposes funded and dollar value	5-3(FY2010), 35(FY2011) RI, HE How many PROPOSALS for additional funding (NASA and external), based on research/activity supported by Space Grant, were FUNDED? What is the total dollar value of the amount received through the PROPOSALS WON (FUNDED)?	Project Management> Activity Data CORE DATA (Slide 43) Proposals Proposal Title Institution Name of Funding Organizations Type of Funding Organization Amount Requested Amount Received	FY2010-2011 Validity: Low. In FY 2010, there is a possibility that Consortia that did not have data reported zero. Reliability: Low FY2012-13 **Validity: Current form is Low, but potentially high**. The way data are collected varied by Consortia. However, since the proposal and associated information are listed, the evaluator can verify. Outcomes from fellowship/scholarship may not be included. Evaluator will need to verify with Consortia. Reliability: Currently is Low, but could be higher once the evaluator verifies information, and reporting period.
F/S, HE, RI # of Direct Participants who were pre service teachers	5-4(FY2010), 36(FY2011) OUTCOME 1: F/S RI, HE Please provide an aggregate number each of the questions. These data are for informational purposes only and will not be aggregated with Direct Participant Data collected in this survey or in the FY2010/FY2011 Student Data Tables. It is anticipated that the responses to the following question are a subset of the total participants in Space Grant supported Outcome I activities/projects. Data entered should be representative of DIRECT PARTICIPANTS in your Fellowship/Scholarship, Higher Education, and Research Infrastructure Programmatic Elements. If the number is zero, please enter "0". How many Direct Participants in Outcome I, Space Grant supported projects/activities, were Preservice Teachers?		Validity: Low because in FY 2010, a definition of pre service teacher varied. Reliability: Low
F/S, RI, HE # of Direct Participants who were pre service teachers and who received direct monetary award.	5-4(FY2010), 36(FY2011) OUTCOME 1: F/S, RI, HE How many of these Preservice Teachers received direct support in the form of a monetary award?		Validity: Low because in FY 2010, a definition of pre service teacher varied. Reliability: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
F/S, RI, HE **# of Significant awardees from 2010 who did not receive monetary support.**	5-4(FY2010), 36(FY2011) F/S, RI, HE Refer to FY2010/FY2011 Table B - Longitudinal Tracking. How many "significant awardees" from 2010/2011 did not receive direct monetary support (but their experience was greater than or equal to 160 contact hours)?		We did not review the data in FY 2010 and FY 2011. Based on the interviews with Consortia director, we think the number reported is not valid because one consortium director reported Consortia had different understanding of the number. Also, this observation was verified when we asked FY 2012-2013 collection. So, we think the number is not valid and reliable across Consortia.
F/S, RI, HE **# of student led project teams**	3-6(FY2011) ONLY (OUTCOME1) F/S, RI, HE How many student-led project teams were supported by your Consortium with FY 2011 funds?		We did not review the data output of Survey monkey, however, based on the findings that Consortia defined project actives differently, and there is no definition of what "student-project teams" should be, Validity: Low because there is a high possibility each consortium had its own definition of what "student lad project teams" should be. Reliability: Low
F/S. RI, HE **# of students participate in significant engagement at NASA Center**	36(FY2011) ONLY (OUTCOME1) F/S. RI, HE Approximately how many Space Grant students were supported by your Consortium to participate in a significant engagement at NASA Center with FY211 funds?		We did not review the data output of Survey monkey, however, based on the findings that Consortia defined project actives differently, and there is no definition of what "supported,"" significant engagement" should be, Validity: Low because there is a high possibility each consortium had different ways to count the number of students to answer this question." Reliability: Low
F/S, RI, HE **# of students participated in significant engagement in industry**	36(FY2011) ONLY (OUTCOME1) F/S. RI, HE Approximately how many Space Grant students were supported by your Consortium to participate in a significant engagement in industry with FY 2011 funds?		We did not review the data output of Survey monkey, however, based on the findings that Consortia defined project actives differently, and there is no definition of what "supported,"" significant engagement" should be, Validity: Low because there is a high possibility each consortium had different ways to count the number of students to answer this question." Reliability: Low

Data	Survey Monkey (FY2010-11)	OEPM system (FY2012-13)	Validity reliability notes
F/S, RI, HE # of students participated in a significant engagement on college campus	36(FY2011) ONLY (OUTCOME1) F/S. RI, HE Approximately how many Space Grant students were supported by your Consortium to participate in a significant engagement on a college campus with FY 2011funds?		We did not review the data output of Survey monkey, however, based on the findings that Consortia defined project actives differently, and there is no definition of what "supported,"" significant engagement" should be, Validity: Low because there is a high possibility each consortium had different ways to count the number of students to answer this question." Reliability: Low
F/S. RI, HE Explanation of the change in number of Direct Participants from previous year.	5-5(FY2010), 37(FY2011) F/S. RI, HE "Comparison of FY2009/FY2010 to FY2010/FY2011 Student Data Tables: In terms of the total number of Direct Participants (Comparison of FY2009 /FY2010Tables A.1, A.2, A.3, and B to FY2010/FY2011 Tables A.1, A.2, A.3, and B), provide a brief explanation for variances of a significant nature between the two reporting periods, in terms of the number and/or demographics of direct participants (both funded and unfunded). If there are no significant variances, please provide a brief statement indicating that a comparison was completed Open-Ended Response"		Narrative
Explanation of change in expenditure, publications, patents, proposals, new course, revised course, faculty and evaluation strategy from previous year.	5-5(FY2010), 38(FY2012) "Comparison of FY2009 Performance Data Report to FY2010 Submission: Please provide an explanation of any variances between the two reporting periods in terms of the following data elements: Expenditure Summary, Publications, Patents, Proposals Submitted, Proposals Won, New Courses, Revised Courses, Faculty and/or Evaluation Strategy. If there are no significant variances between the two reporting periods, please provide a brief statement that the comparison was completed. Open-Ended Response"		Narrative